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COAL AGE

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SUN MINE LUBRICANTS

Keep Air Compressors on the Job . . . Eliminate Sticky Valves

No war job in the country is more important than that being done so efficiently by the Anthracite Coal Industry in meeting the threat to America's health and war effort created by the critical shortage of other fuels. Getting out the coal is vital on the home front and the fighting front.

In one of the largest anthracite mines trouble developed more than a year ago in their air compressors. Sticky deposits on the unloader valves caused frequent shutdowns for cleaning. A Sun Oil Engineer—one of those Doctors of Industry—was called in. His analysis and recommendations resulted in a switch from competitive oils to Sun Lubricants. Trouble vanished and valves have not stuck since then.

Such service is an everyday occurrence for Sun Doctors of Industry and Sun Lubricants. Whatever your lubrication problems may be, feel free to call in a Sun Engineer. Don't permit faulty lubrication to hamper all-out production of the coal that is vital to victory! Write....

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Sun Oil Company, Limited, Toronto, Canada

SUNOCO

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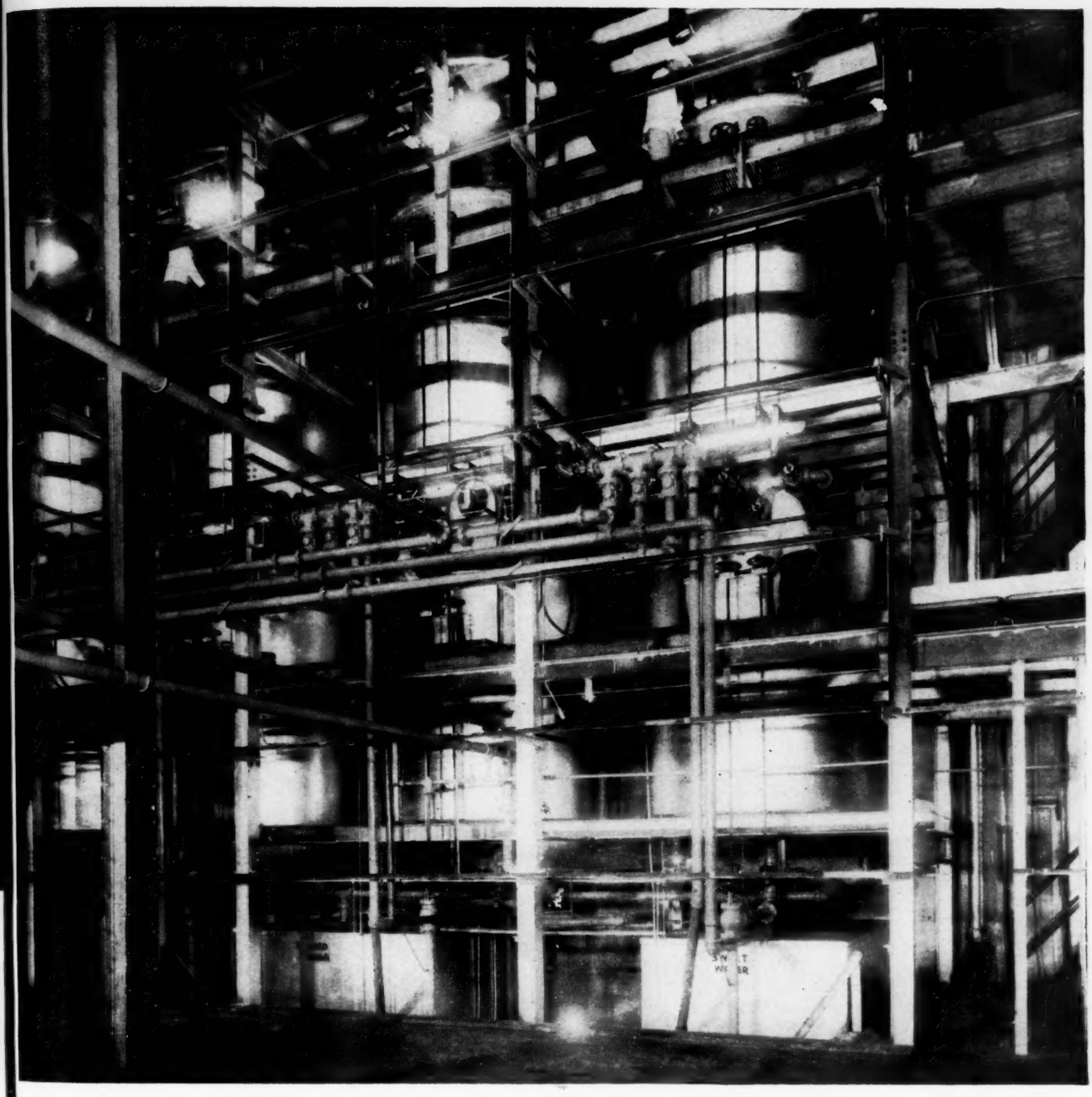


How to coax more sugar from a beet

A typical example of B. F. Goodrich development in rubber

DON'T throw away your ration card just yet, but America *is* going to have more sugar because of those big tanks.

It used to take seven steps to make sugar from beets — the last four to make the sugar white instead of brown. A company in the sugar beet country developed a new method of only three steps—the third (the tanks in the picture) did all the cleaning necessary, and the sugar came out white as ever. What's more it was sweeter and they got 6% more from the same beet.

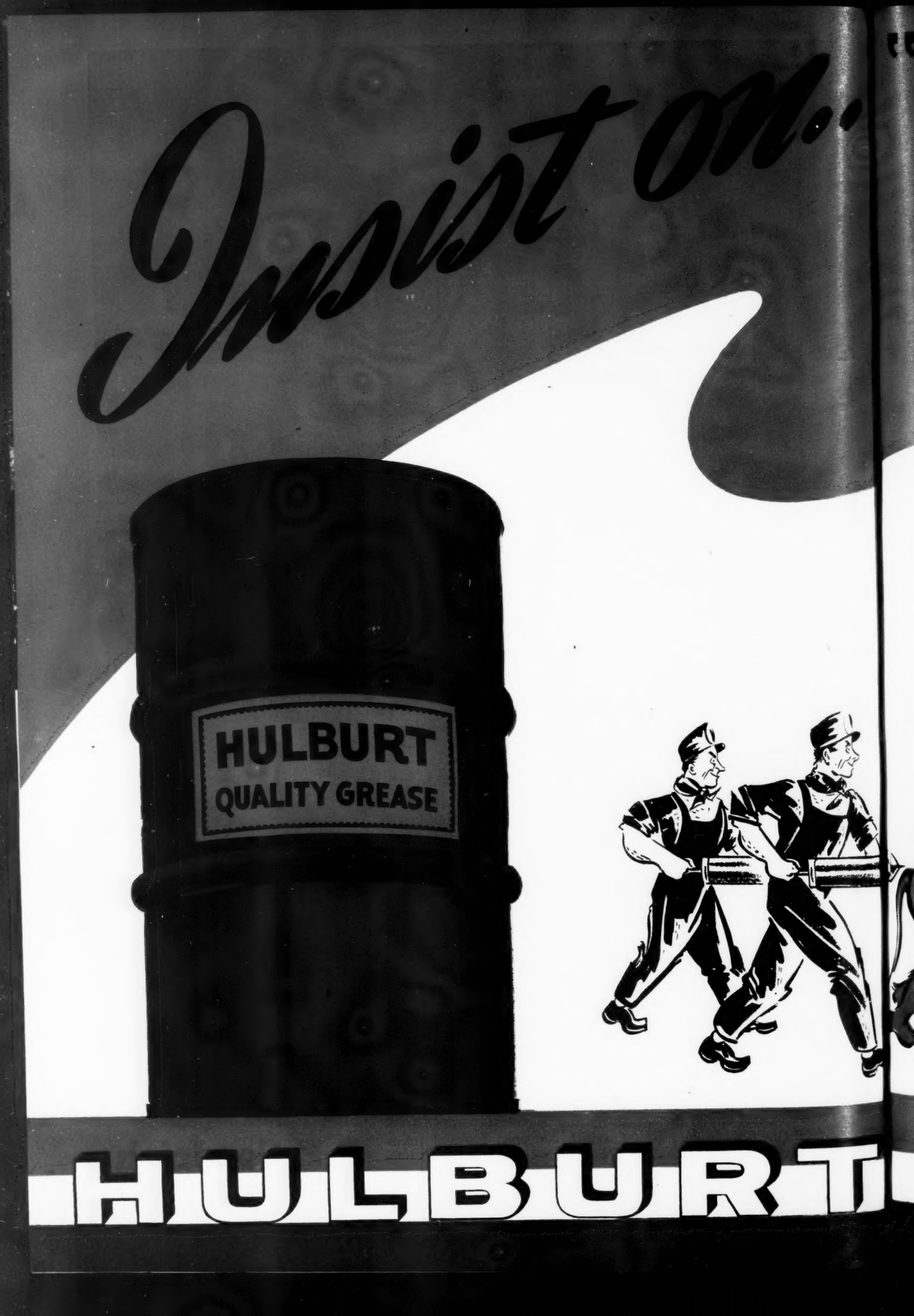
At least that was the theory. But —the metal of the tanks discolored the sugar as fast as the new process cleaned it. Tank linings were tried. Same result.

The company came to B. F. Goodrich whose engineers have had years of experience in lining tanks used in steel mills and chemical plants. B. F. Goodrich developed a special cream-colored rubber that does not discolor the sugar, that imparts no taste, is easy to keep clean, and will last for years.

The tanks in the picture are lined with this B. F. Goodrich rubber and have already increased the sugar supply, reduced its cost, and added to farmers' income since they're paid on the sugar produced from their beets. If you're in war work or any essential industry, don't decide that any problem involving rubber can't be solved. Put it up to the *B. F. Goodrich Co., Ind. Prod. Div., Akron, O.*

B.F. Goodrich

FIRST IN RUBBER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QUALITY GREASE
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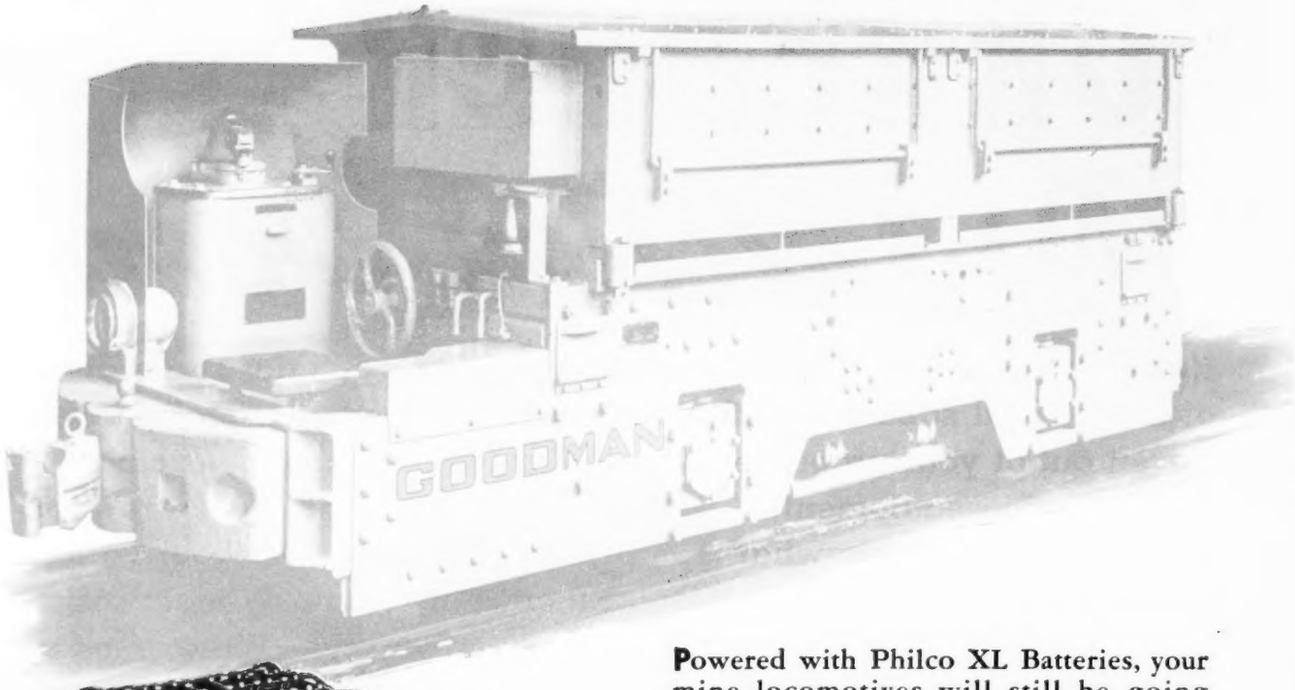
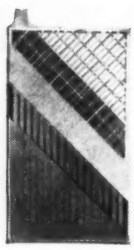
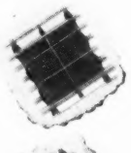


10% GREATER CAPACITY...SUSTAINED HIGH VOLTAGE...LONG PRODUCTIVE LIFE

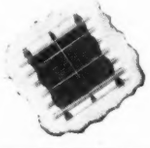


(*Upper right*) Philco "K" Process produces a flint-hard, porous plate.

(*Lower right*) Ordinary plate drying.



(*Left*) Philco Triple Insulation—Glass Fibre Mats, Slotted Rubber Retainers, rugged Philco Separators.



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Philco XL Batteries give you *10% greater capacity*... every charge lasts 10% longer!

Here's why: Philco XL grids give greater plate area without increase in outside battery dimensions... Philco "K" Process plates and Philco Triple Insulation assure maximum retention of active material!

Today, when the country is begging for greater coal production, Philco's 10% reserve power, sustained high voltage and extra wallop are vitally important! Use the coupon to get latest Philco Mine Battery Catalog.

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REPLACE WITH RUGGED, HIGH CAPACITY PHILCO MINE LOCOMOTIVE BATTERIES!

CONTENTS

VOLUME 48 APRIL, 1943 NUMBER 4

New Opportunities for Coal Foreseen for Future.... 54
By HAROLD L. ICKES

Preparation Plus Marks Consolidation Jenkins Plant. 65
By J. H. EDWARDS

Old Ben 2,200-Hp. Hoist Survives Storage and Fire.. 76

Modern Shop Eases Mechanical-Mining Maintenance 79

Air Surveys Indicate Air and Power Savings..... 82
By J. H. DICKERSON

Deepwell Unit Takes Over From Six Other Pumps.. 85

Appalachian Operators and Miners in Wage Parley. 103

Editorials	53	Manufacturers' Tips	90
Foremen's Forum	86	Operating Ideas	99
Questions and Answers	88	News From the Field	103

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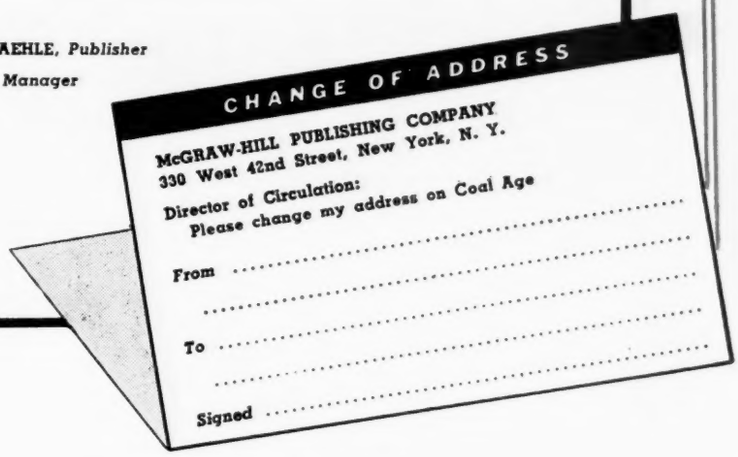

COAL AGE

COAL AGE (with which is consolidated "The Colliery Engineer" and "Mines and Minerals") is published monthly on the 1st. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, Coal Age, 330 West 42d Street, New York, N. Y.

Subscription rates: United States, Mexico, Central and South America, $3 for one year, $4 for two years, $5 for three years. Canada, $3.50 for one year, $5 for two years, $6 for three years. Great Britain and British Possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 for one year, $10 for three years. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U. S. A. Cable Adress: "McGraw-Hill, N. Y." Member A.B.P. Member A.B.C.

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Editorial and executive offices, 330 West 42d St., New York, N. Y. *Publication office,* 99-129 North Broadway, Albany, N. Y. *Branch offices:* 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta; Los Angeles.

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COMING COAL AGE ATTRACTIONS

• "Tested Methods of Increasing Tonnage" will be the theme of a special section in the May issue of Coal Age. With tonnage demands rising, manpower losses increasing and available evidence strongly indicating a decline in output per man on the job, Coal Age plans to offer a number of ways of using machinery more efficiently to increase individual efficiency. The hints will apply to face operations of all types, as well as auxiliary activities influencing the performance of face equipment, such as power supply, supply service and inspection and maintenance.

• A list of other timely and pertinent articles will supplement and reinforce the material on "Tested Methods of Increasing Tonnage." Maintenance methods at the Indiana operation of the Snow Hill Coal Corp. will be one. In this article, Fred Miller, Harold N. Lowry and E. M. Ingleman will discuss point by point the Snow Hill methods of maintaining track-mounted loading machines and auxiliary equipment, as well as matching methods of storekeeping.

• Also on the fire for this and succeeding issues are articles on stripping developments, including the new-type electrical controls now being employed; power from exhaust steam, scrap salvage at coal mines, operation of wagon mines in southern Illinois and maintenance of electric motors.

No. 1 is the "Salesman" for No. 2

Consolidation Coal Company in 1940 Equipped its Ultra-Modern Mine No. 32 at Owings, W. Va. with the

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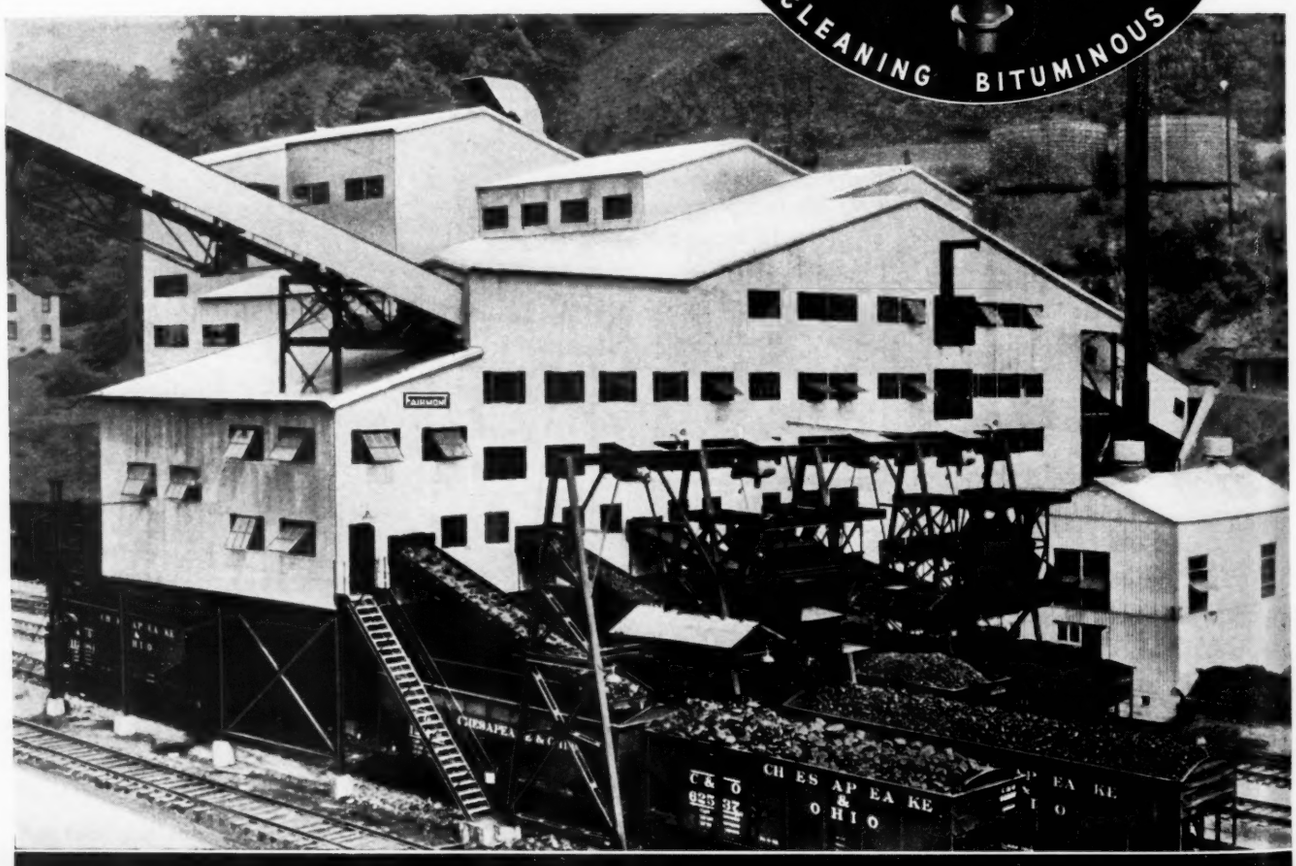
SAND FLOTATION PROCESS

The Performance of this Equipment Handling 3500 Tons per Day was Directly Responsible for a Second CHANCE Installation at Consol No. 207—this Company's Latest and Finest Preparation Plant.... Another Case of "Once a CHANCE User, Always a CHANCE User."



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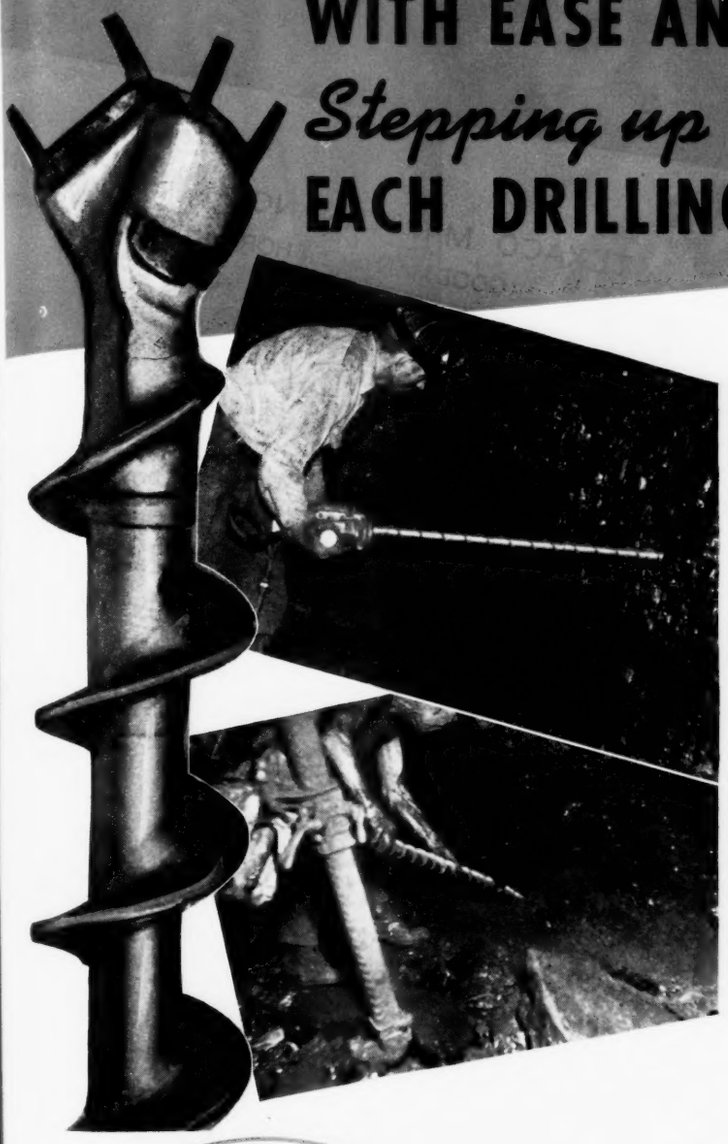

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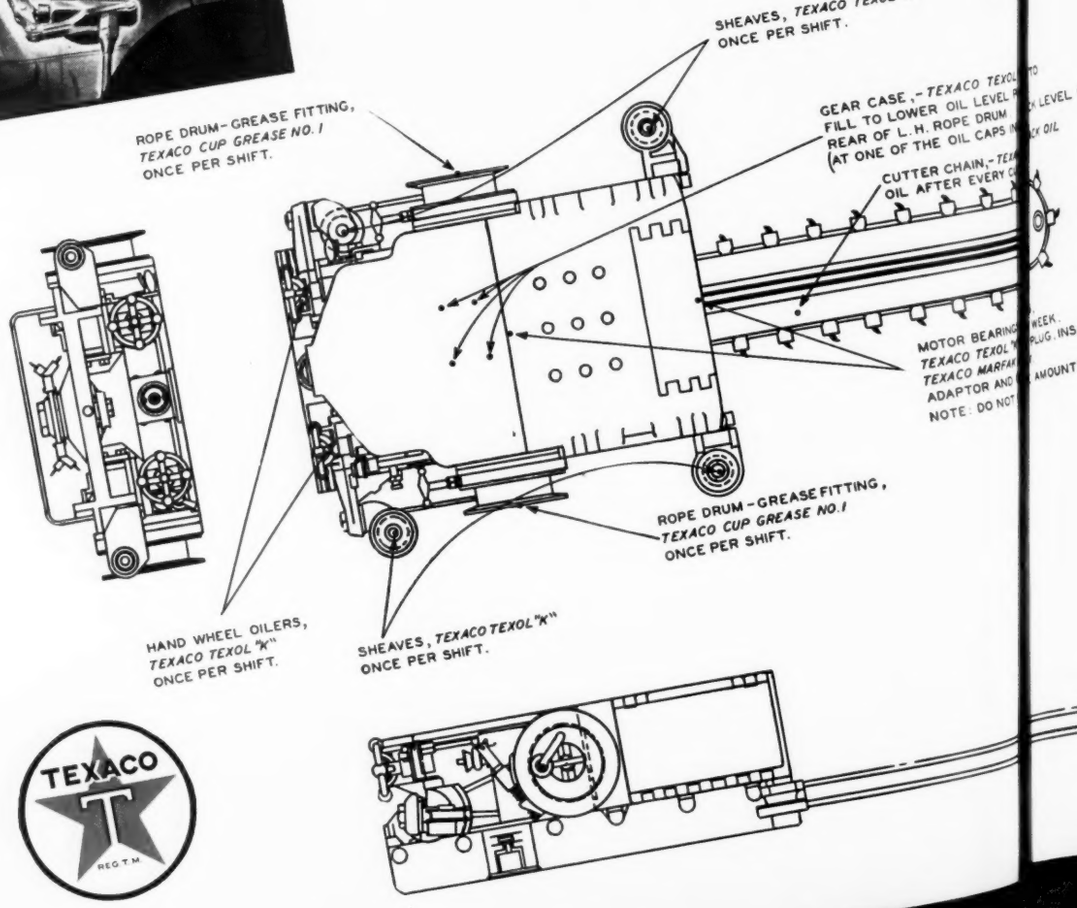
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To insure your equipment producing at maximum capacity, it must be efficiently lubricated. To provide this The Texas Company has made available Texaco Maintenance Lubrication Charts.

Developed in cooperation with the engineering staffs of prominent equipment makers, these Charts (12″ x 18″ in size) show at a glance exactly *where, when* and *with what* lubricant to service each and every lubrication point of your cutters, loaders, locomotives . . . with lubricants approved by the manufacturer.

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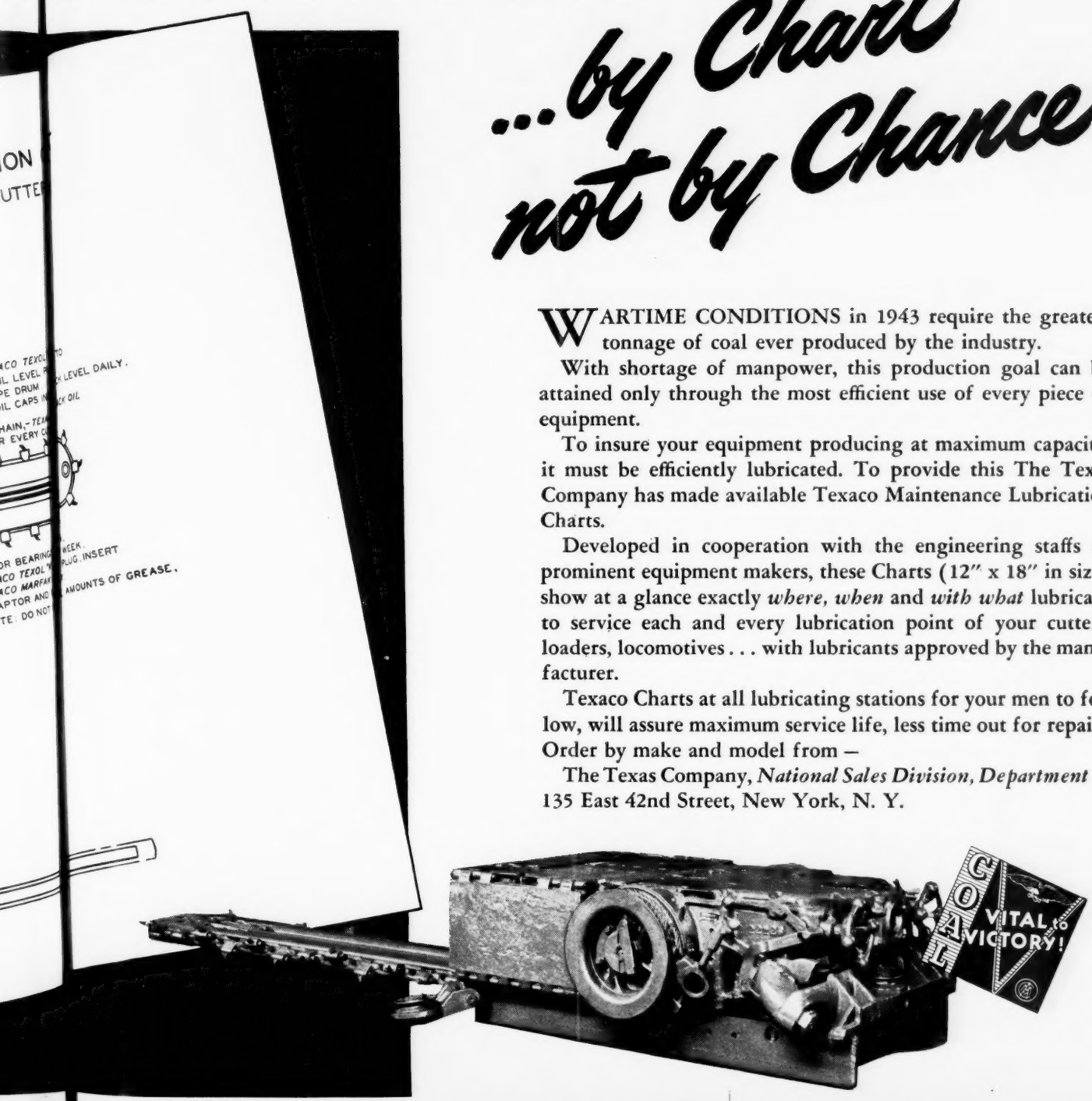

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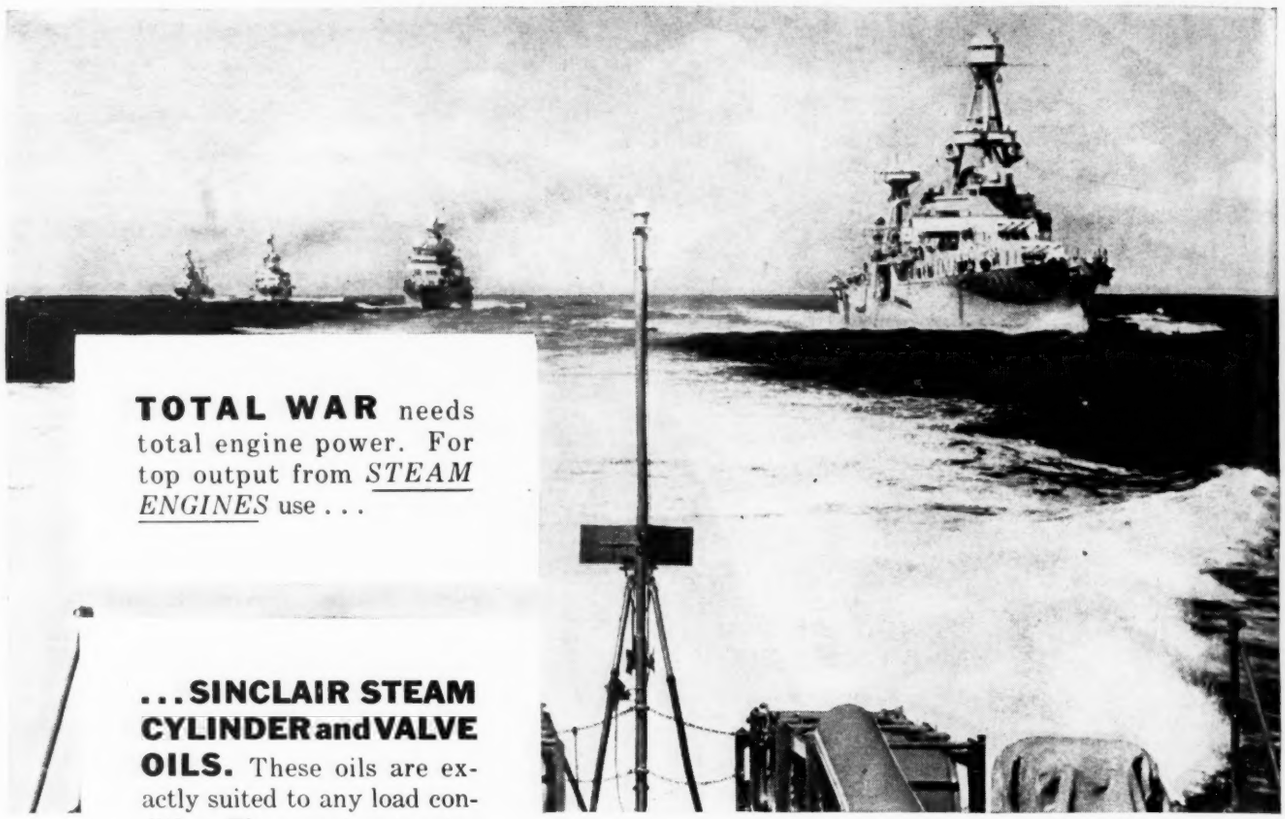
FOR THE COAL MINING INDUSTRY



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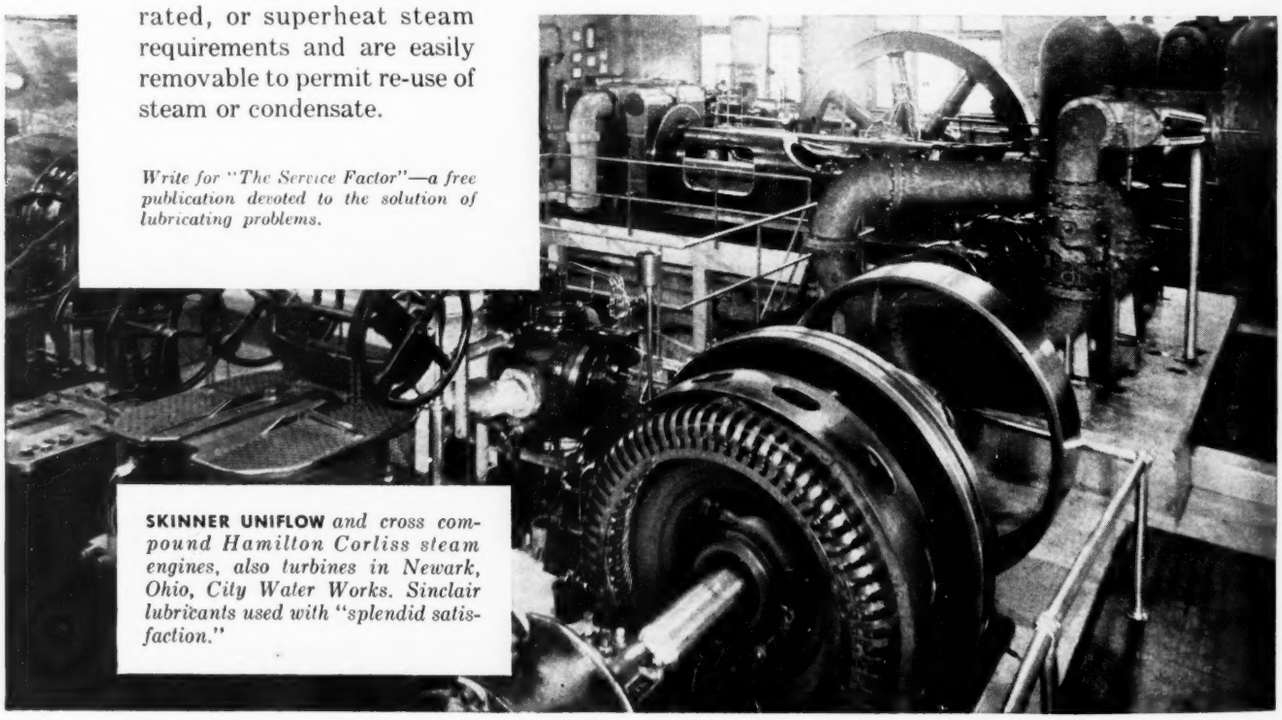

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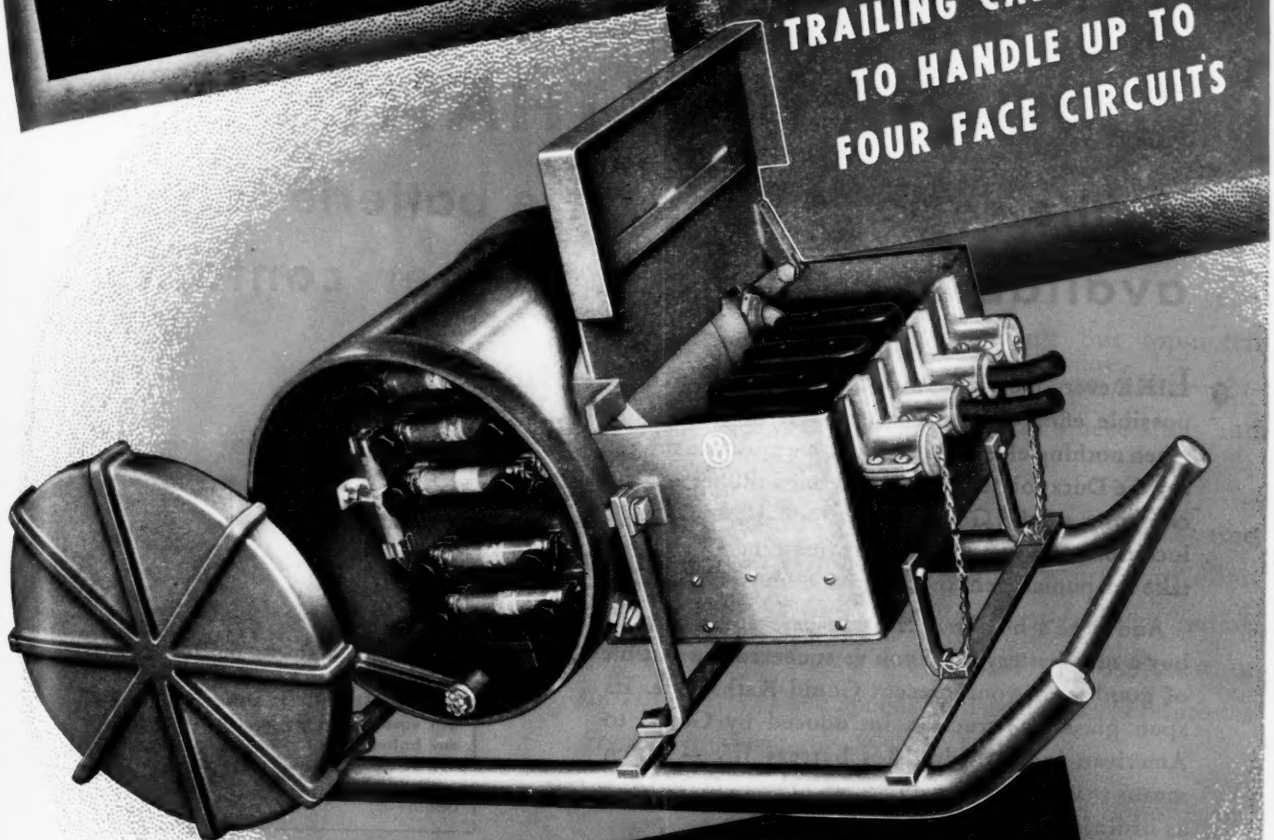

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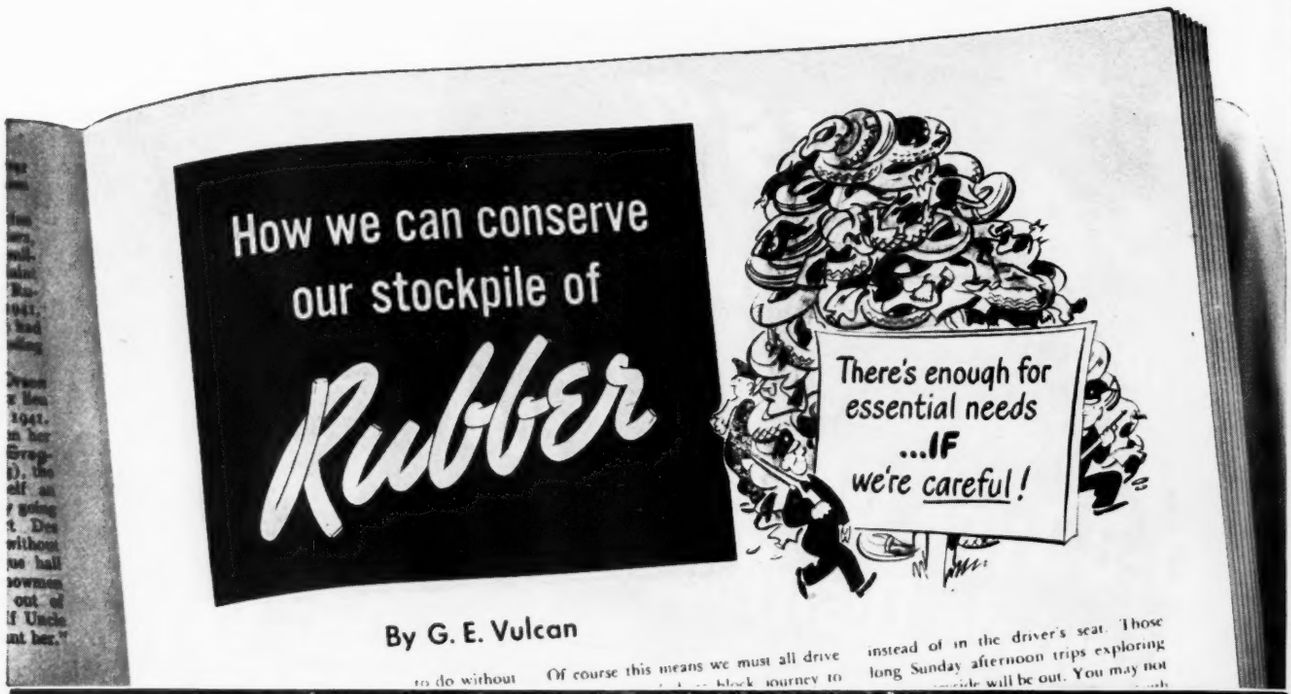


GOULD KATHANODE

shuttle car and locomotive batteries are still available with hard rubber containers

LIKE everyone else, Gould is making the greatest possible effort to conserve rubber. It's used only when nothing else will do. Thus, we must use rubber for the Durapor separators and hard rubber for the container of the Gould Kathanode shuttle car or locomotive battery—the only materials that will take the punishment these batteries must endure.

And here's how *you* can conserve rubber: don't buy a new battery until you've squeezed the last bit of good from your present Gould Kathanode. Its spun glass construction introduced by Gould to American industry doubles battery life — which means that Gould Kathanode will last twice as long as ordinary batteries lacking this feature.

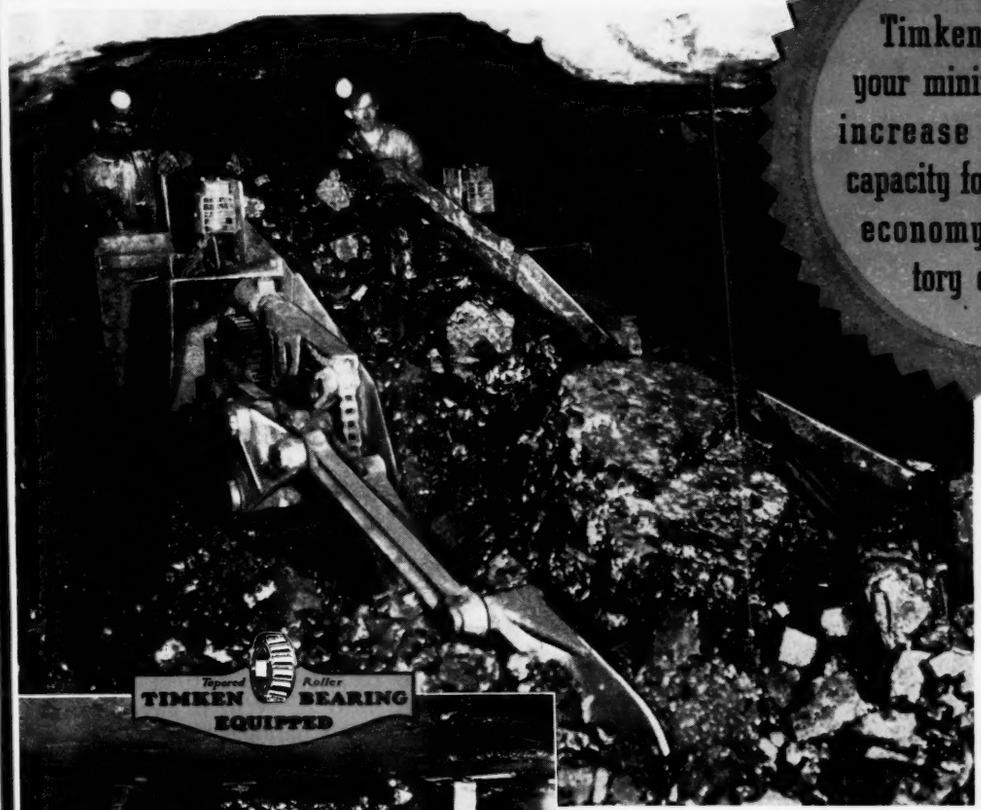
RATED CONSERVATIVELY—Goulds will *equal or exceed* in capacity any battery of comparable size and cell structure. Buy on proven performance and you will buy Gould!

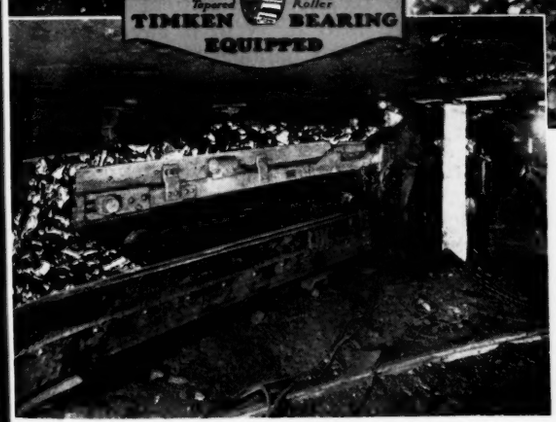
FREE HELP ON BATTERY PROBLEMS—*Your Gould Service Man will help you get full service from your present equipment, regardless of make. No charge, no obligation. Write Gould Storage Battery Corp., Depew, N. Y. Ask for FREE descriptive literature on any type of industrial installation.*

GOULD THE BATTERY PICKED BY ENGINEERS

Whaley "Automat" Coal Loading Machine with shoveling action, equipped with 15 Timken Bearings at the important points of friction and hard service.

Put more Timken Bearings in your mining equipment—increase its productive capacity for Victory and its economy for post-victory competition.





Whaley "Automat" discharging coal into cars by means of its parallel lift rear conveyor.

Don't be satisfied with anything but top-notch performance in the new equipment you make—performance that measures up to today's necessities and tomorrow's probabilities.

Redesign if you have to—and install Timken Tapered Roller Bearings at every suitable position to eliminate once and for all the threats of friction; radial, thrust and combined loads; and misalignment of moving parts. Then speeds will be higher, endurance greater, maintenance lower.

A few Timken Bearings are better than none in any kind of equipment, but you will not know what they can really do until you have them at every point of friction and hard service.

Equipment designers who use Timken Bearings wherever they can, produce machines that not only *perform better* but also *sell better*—because no name in bearings means so much to the buyer as "TIMKEN". The Timken Roller Bearing Company, Canton, Ohio.

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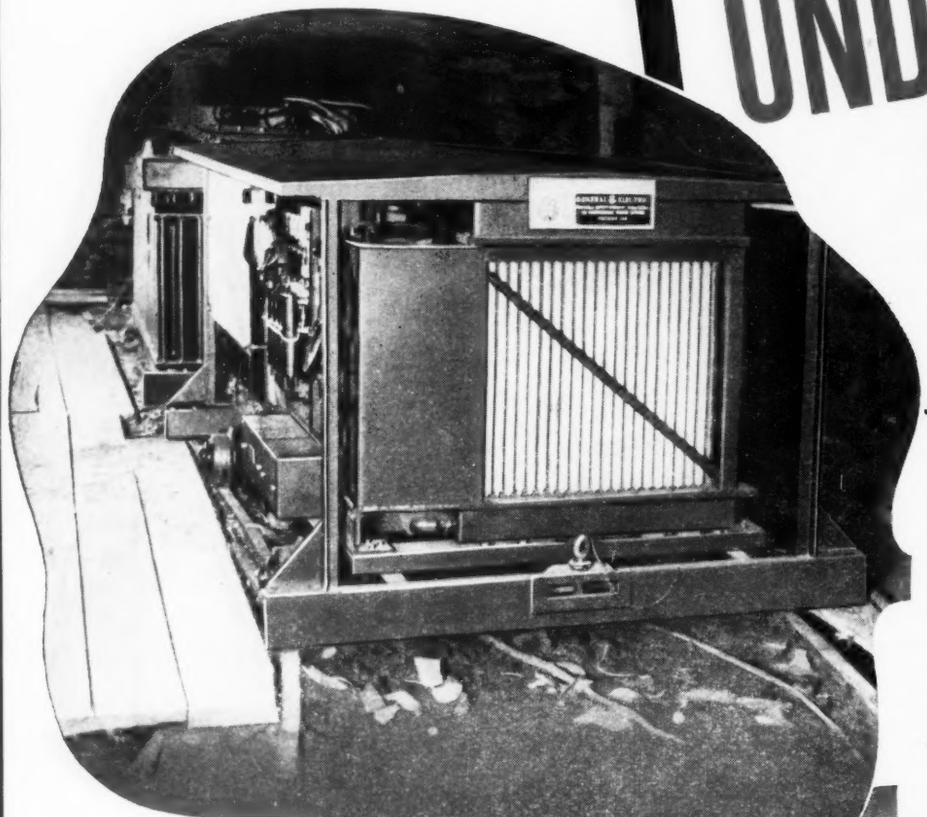
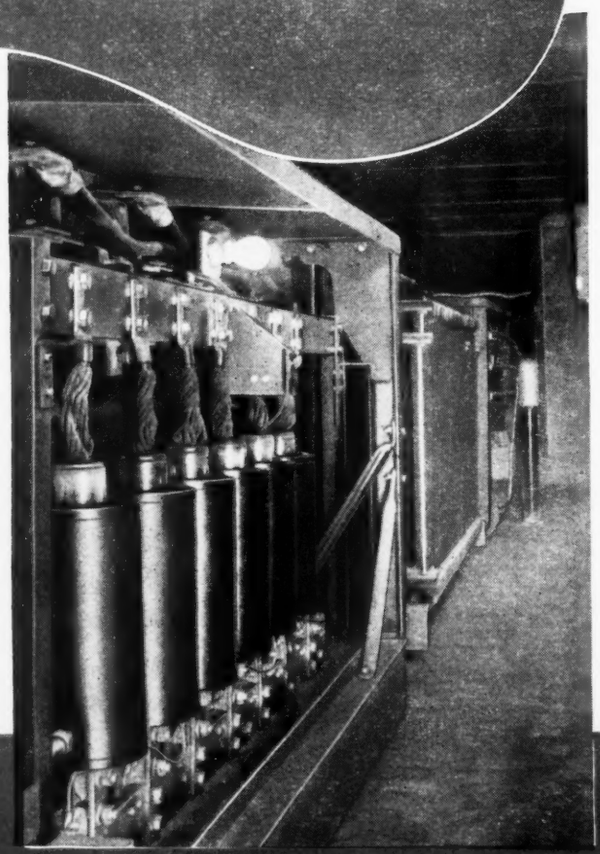
TAPERED ROLLER BEARINGS

"All There Is In Bearings"

HERE'S UNDERGROUND POWER

In the Big Jim Coal Company mine at Blanche, Ky., this 200-kw G-E portable, d-c substation gives full voltage for most efficient operation equipment at the working face. There's no need for long runs of heavy copper. ↓





→ A close-up of sealed-ignitron units on the rectifier car of a 300-kw portable substation at Union Collieries, Renton, Pa. As a means of underground conversion these factory-sealed, all-metal units make mercury-arc rectification the most practical and the most economically maintained.

TODAY, your decisions concerning underground power depend on a new set of factors: Will a new d-c substation help bring up enough more coal to balance the critical materials that go into it? Will it save enough manpower to balance the installation work? And how soon can it be obtained?

On each of these new counts—as on the old cost-saving, loss-reducing basis—G-E portable substations with sealed-ignitron rectifiers have the odds on their side. Conversion to d-c closer to the working face saves a large amount of copper, an extremely critical material today. It keeps full voltage at the working face. With full voltage at the face you can get greater output from your mechanized equipment, which means you can bring up more coal.

The sealed-ignitron mercury-arc rectifier does the conversion job with less servicing, thus saving manpower. What maintenance there is, is easy. It's a "natural" for mine conditions, where grit and dirt are such a threat to rotating machines.

These G-E portable substations for underground mine service are supplied in ratings from 150 kw to 500 kw; 275 volts to 600 volts, d-c. At the present time we can deliver them to you in less time than it takes to deliver rotating equipment. For complete details and delivery information, call our local office. ***General Electric Company, Schenectady, New York.***

The Army Navy "E", for Excellence in the manufacture of war equipment, now flies over six G E plants employing 100,000 men and women.

in step with the times!

G-E Portable D-C Substations . . . with Sealed-ignitron Type Rectifiers

★ **FOR GREATER OUTPUT** Complete mobility underground makes it easy to keep full d-c voltage at the face, thus getting the most out of mechanized equipment.

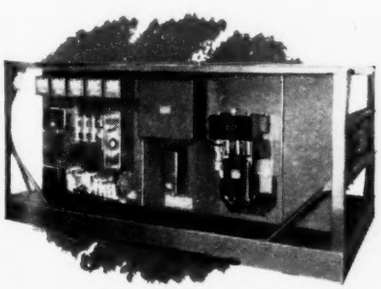
★ **FOR SIMPLER MAINTENANCE** No major rotating parts to care for. The sealed-ignitron units (warranted for 3 years' service) require no pumping. No need for specially trained personnel.

★ **FOR WARTIME CONSERVATION** Saves copper, lowers energy losses in d-c transmission circuits. Requires less critical material than any other type of conversion equipment.

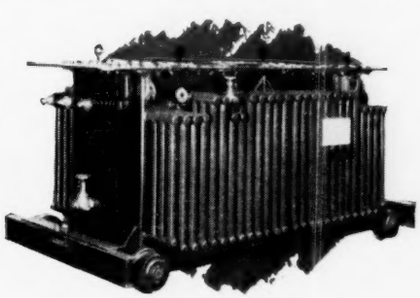
★ **FOR BETTER DELIVERY** At present, delivery schedules on rectifier units are substantially shorter than on rotating equipment. In most cases, over-all costs are lower, too.

JUST "RUN IN" THREE PORTABLE UNITS AND YOUR D-C POWER IS READY

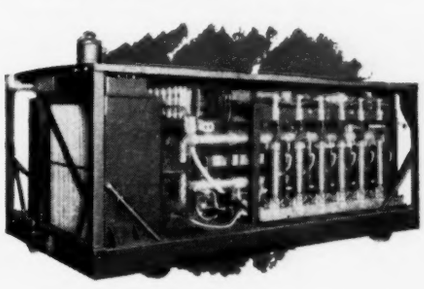
These three integrated "car units" make up a complete substation:



A-c automatic-reclosing switchgear



Pyranol transformer unit

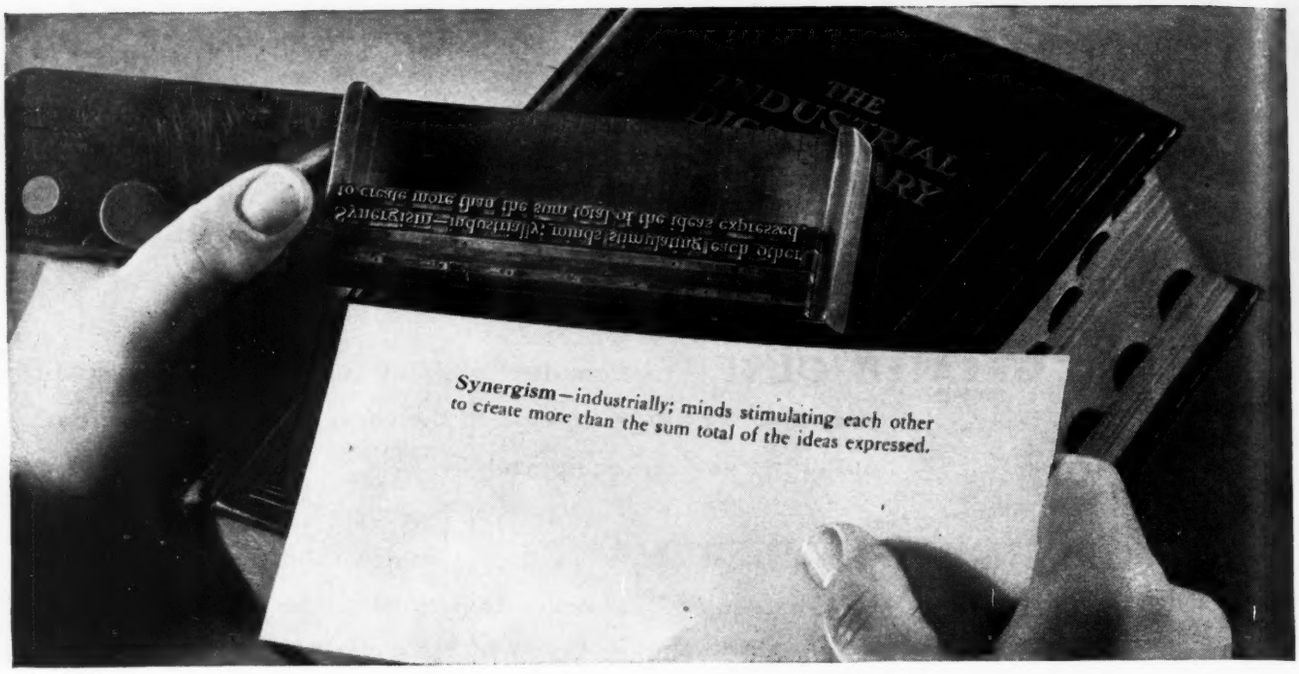


Rectifier car with d-c reclosing switchgear

Builder of ALL TYPES of mine power-conversion units—motor generators, synchronous converters, and rectifiers

GENERAL ELECTRIC

A New Definition



for the Industrial Dictionary

New ideas create new products, new methods, new words to describe them. And out of this war a word is emerging with a new meaning for future industrial progress—"Synergism."

War production has brought gigantic strides in industrial cooperation. Men have banded together to cooperate with a will-to-accomplish in a degree far greater than ever the world has known.

As minds meet to cooperate with the single purpose of accomplishment, they stimulate each other to create more than the sum total of the ideas expressed—"click to give a plus value" might be the slang for it. This is "Synergism."

Synergism is not a new word. It's an old word, with classic Greek roots meaning "working together." It long has had its meaning in chemistry, in medicine, in theology. Basically, it has always meant forces working together to develop a whole greater than the sum of the parts.

And war accomplishment has re-introduced "Synergism" with a significant meaning for Industry. It provides a name for the factor that keeps working miracles in industrial progress.

We at Atlas have been practicing synergism in our spheres of chemical production to accomplish some outstanding results in collaboration with other companies. We think our minds will "click" with yours. Let us try the experiment.

ATLAS POWDER COMPANY
WILMINGTON, DELAWARE

Offices in Principal Cities

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

Copyright 1943, Atlas Powder Co.

Jeffrey 35

SHORTWALL COAL

ACKNOWLEDGED COUNTRY-WID

A MACHINE FOR EVERY CONDITION

Time

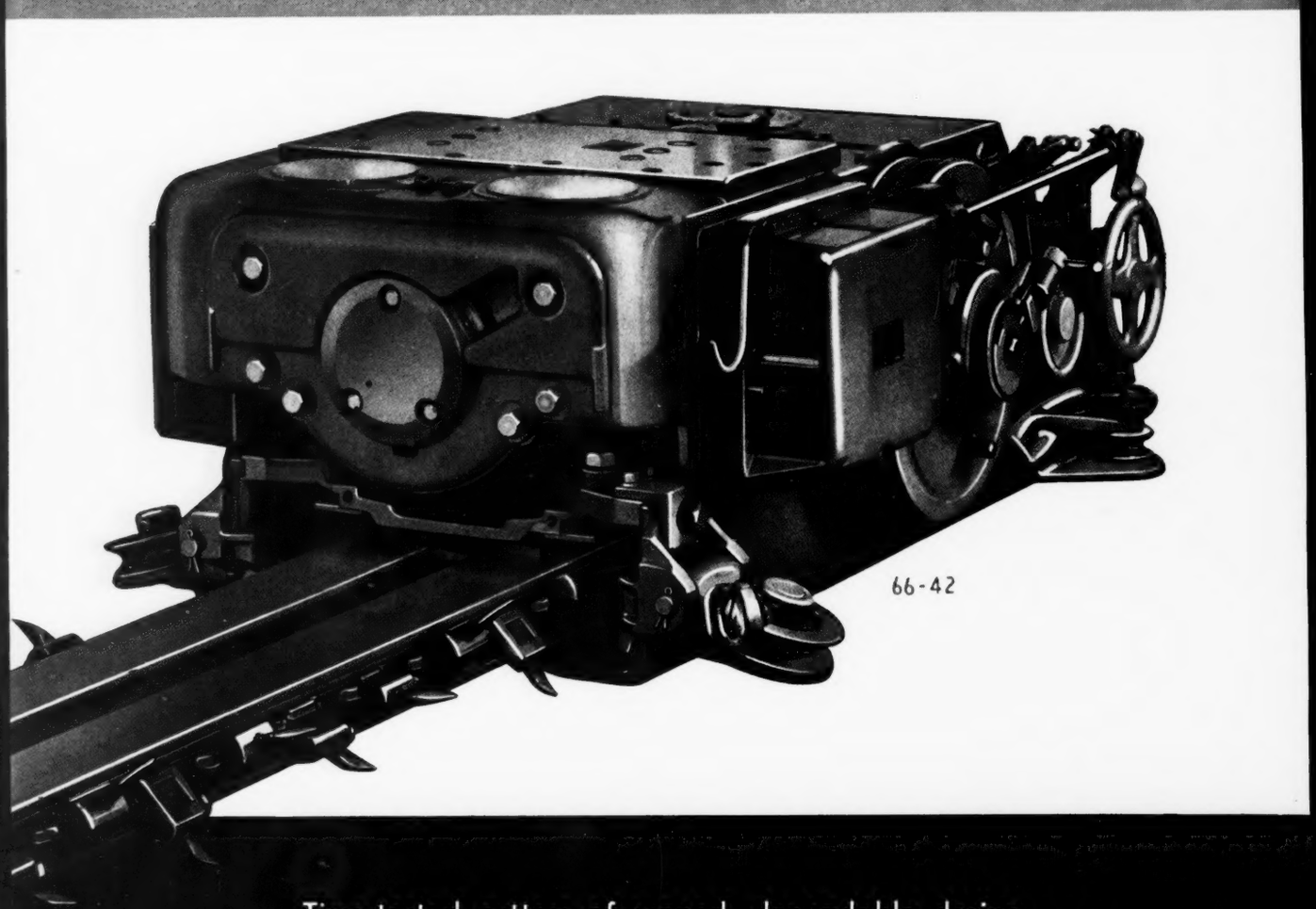
few

elec

walls

COAL CUTTERS ★ ★ ★

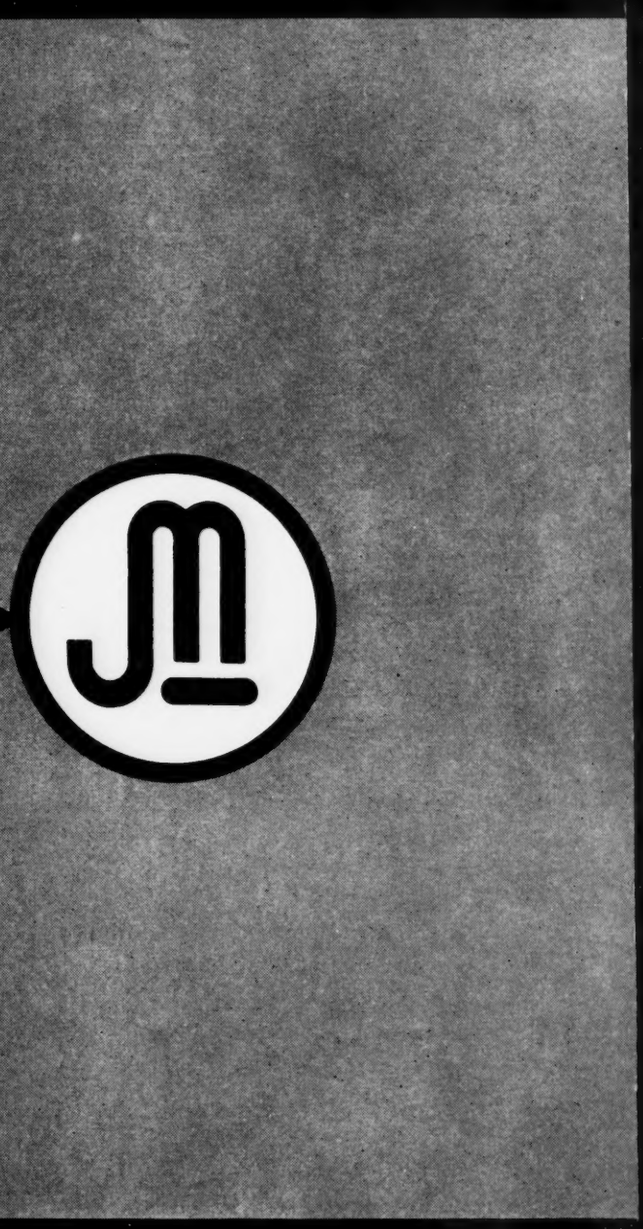
UNTRY-WIDE · · · FOR LOW MAINTENANCE



Time-tested cutters of rugged, dependable design . . . few slow-moving parts . . . slow-speed motor . . . sturdy electrical control . . . that's the mighty "35" series short-walls. Eight types including five for conveyor mining.

JEFFREY
EQUIPMENT for MECHANIZED MINING

LOADERS
CONVEYORS
LOCOMOTIVES
FANS
DRILLS
CUTTERS
BLOWERS
JIGS
CRUSHERS
SCREENS
RENEWAL PARTS



BELOW AND ABOVE GROUND
FROM FACE TO RAILROAD CAR

E Y
for
INING

ROUND
D CAR

MAINTENANCE HINTS FOR SHORTWALL MACHINES . . .

To get continuity of service and maximum production from your cutting machines with the least time out for repairs.

1. KEEP THE CUTTING MACHINE CLEAN

Look inside motor frames periodically. If accumulation of dirt or grease is found, remove it and remove cause. Keep commutators and brush holders clean — also inside of all electrical enclosures. Cleanliness helps to reveal minor defects — permits correction before they result in breakdowns requiring major repairs.

2. MAKE SCHEDULED INSPECTIONS

See that all control contacts make good contact — replace before too worn to function properly. Check electrical connections — see that they are tight. Look over gearing for any irregular wear or misalignment that might reveal excessively worn or damaged bearings that should be replaced. Generally some unusual noise accompanies this condition. Keep cutter chain properly adjusted — not too tight. Keep friction controls for rope drums properly adjusted. Inspect disc type friction clutches periodically. Replenish or renew oil as often as necessary with recommended grade to insure free operation of clutches.

3. LUBRICATE AT REGULAR INTERVALS

Use proper kind and proper amount of lubricant, as indicated on lubrication chart. Handle all lubricants and lubricating devices so that they do not become contaminated with foreign matter.

4. OPERATE THE MACHINE PROPERLY

Pause on each point of controller when starting the motor. Running through the points too quickly is detrimental to the motor, particularly the commutator. Do not run on resistance except for such speed control as may be required in tramming. Do not run with dull bits — keep cuttings shovelled away from chain. Dull bits — cuttings carried back in the kerf — cutter chain too tight . . . not only overload the machine but cut down production.

THE JEFFREY MANUFACTURING COMPANY
912-99 North Fourth Street, Columbus, Ohio

Sales Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake City

Service Stations: Pittsburgh, Harlan, Ky., Birmingham, St. Louis, Logan-Beckley, W. Va., Scranton

STANDARD OIL ANNOUNCES

NEW Stanobar GREASE

For easier handling in grease guns ...longer life in anti-friction bearings

A war-bred grease for wartime jobs. Today's production pace demanded this new type grease. Longer hours of operation alone call for a more stable grease to resist heat and oxidation, while the need for more frequent lubrication of bearings makes an easily handled gun grease an asset.

Stanobar brings you both these advantages. It's a smooth (not fibrous) type grease. It contains inhibitors which reduce oxidation of both the soaps and oil in Stanobar. That means less cleaning of bearings and less labor and lubricant required to flush out old grease.

Stanobar resists thinning out when worked—that helps reduce leakage. It may also enable you to replace two or three grades of grease you are now using with this one grade of Stanobar.

Let a Standard Lubrication Engineer explain some of the other advantages of new Stanobar—and help you make a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

How to service ball and roller bearings. Proper packing of bearings after inspection is highly important. Bearings equipped with pressure fittings are sometimes replaced dry and filled with a grease gun, but a careful, hand-packed grease job is well worth the little extra time it may take. The illustrations at the right point out some of the steps to take.

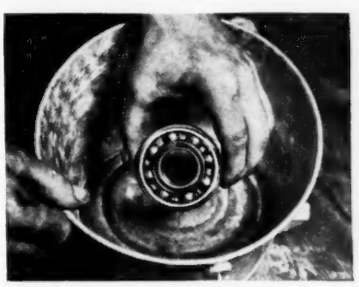
CHECK THESE ADVANTAGES OF NEW STANOBAR GREASE

- . . . Easily handled in grease gun or pressure system.
- . . . Resists thinning-out when worked.
- . . . Does not oxidize and form deposits.

OIL IS AMMUNITION...USE IT WISELY

Clean motor and bearing housing before removing bearing.

Remove bearing, wash it in kerosene, and dry thoroughly with a clean cloth.



Dip bearing in a light lubricating oil. Allow excess to drain before repacking.

Put grease only in depression of spacer (both sides). Then spin one of the races, and wipe off excess grease thrown out. Replace the bearing. Do not put additional grease in the bearing housing.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LU

☑ Check Your Bottleneck!

Here are 3 of the most dangerous bottlenecks threatening U. S. processors today. Check yours...then note how much help you can get from Allis-Chalmers Cooperative Engineering to crack them wide open!

☐ **Unexpected Breakdowns?**

How many of your key machines were built for 24-hour-day service?

☐ **Labor Shortage?**

Do you use any men unnecessarily? Processing is a *machine* industry!

☐ **Overworked Engineers?**

Outside engineering cooperation might solve many problems quickly.

WHICHEVER IT IS— CALL ON ALLIS-CHALMERS!

IT'S TOUGH to crack bottlenecks today...but there's *one* company that *specializes* in helping you do it — Allis-Chalmers!

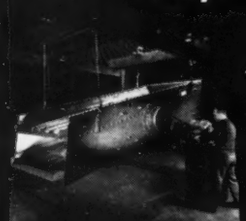
Here's an organization that builds all types of basic processing machinery.

Because it's the business of Allis-Chalmers engineers to know *all phases* of coal mining and processing, they know ways to make units of *existing equipment* "team up" better.

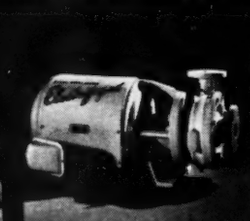
Another important plus that comes from building a full line of equipment: Allis-Chalmers engineers are *not* forced to recommend some *one* type. *What you need* dictates their recommendations, *not what they've got!*

If you have a bottleneck to break, Allis-Chalmers Cooperative Engineering is ready to help. Call your nearby district office. ALLIS-CHALMERS, MILWAUKEE, WIS. A 1578-D

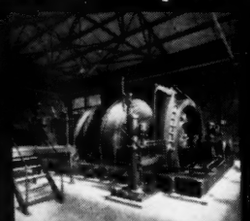
Only Allis-Chalmers Makes a *Complete* Line of this Equipment . . .



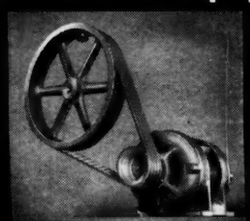
VIBRATING SCREENS — Efficient separation and dewatering—8 different types.



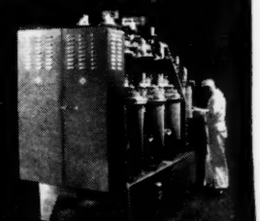
CENTRIFUGAL PUMPS — Largest line, highest efficiencies — built with motors.



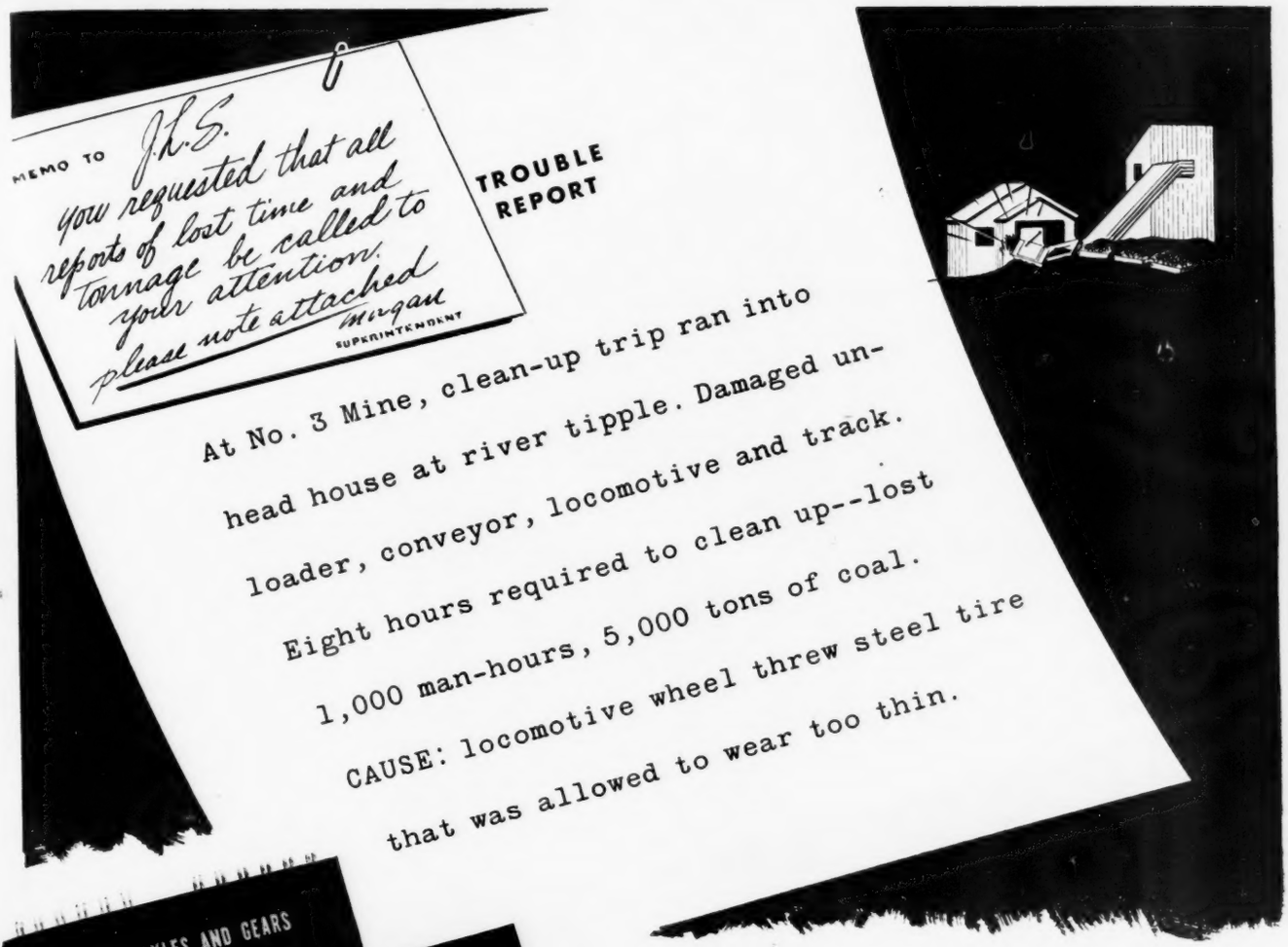
MINE HOISTS — Completely automatic control with new "Regulex" exciter.



MOTORS & DRIVES — Top team — Lo-Maintenance Motor & Texrope V-belts.



RECTIFIERS — Low-loss conversion of a-c into versatile d-c current.


MEMO TO J.L.S.
you requested that all reports of lost time and tonnage be called to your attention. please note attached
Morgan
SUPERINTENDENT
TROUBLE REPORT
At No. 3 Mine, clean-up trip ran into head house at river tipple. Damaged unloader, conveyor, locomotive and track. Eight hours required to clean up--lost 1,000 man-hours, 5,000 tons of coal. CAUSE: locomotive wheel threw steel tire that was allowed to wear too thin.

THIS INSPECTION CHART... on Wheels and Tires tells maintenance men how to prevent failures like that above. It's typical of the practical information contained in the Time-Saver for Westinghouse Mine Locomotives.

Send Today for as many copies of this book as you need for your men. They're free. Write Dept. 7-N; ask for Booklet B-3150.

HERE'S INFORMATION YOU NEED TO

Prevent trouble like this!

Costly failures like that above may already have happened in your mine. If not—they *can* happen, unless you insist on careful inspection.

It's up to you to put the proper information in the hands of your maintenance men. To help you do this, Westinghouse has prepared a new Time-Saver Inspection Manual. It shows *when* and *where* your mine locomotives require attention to keep them operating efficiently. It includes operating tips for motormen that will help *prevent* trouble.

Send for copies of this book now. It can be a mighty important help in maintaining peak production during the coming months. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

J-15077

Westinghouse

PLANTS IN 25 CITIES ... OFFICES EVERYWHERE

MINE LOCOMOTIVES

AT THE SHERIDAN-WYOMING COMPANY'S COAL MINE

- Three Sullivan 7-B Coal Cutters equipped with 9½ foot cutter bars, with feed of 26" per minute, have operated on a 2-shift per day basis for three years . . . cutting 108-132 places per day.
- In 1942, each machine cut from 36-44 places per day . . . a total of more than 753,000 tons of coal.
- The total average maintenance cost, including materials and labor, for these 3 cutters to date is approximately 1c per ton.
- Such records can result only from a combination of modern practice and the most modern equipment.

THIS Sheridan-Wyoming Coal Company mine is representative of the best in modern mining operations, utilizing the most efficient equipment available. Three years ago the company installed three Sullivan 7-B Shortwall Cutters. These 7-B Cutters have operated continually since then on a 2-shift day of 7 hours per shift. During this period, the Sullivan Coal Cutters have cut from 108 to 132 places per 2-shift day. In 1942, the three machines cut more than 753,000 tons of coal . . . at a total average maintenance cost . . . materials *and* labor . . . of *1c per ton.*

This is the kind of record that makes Sullivan 7-B's the first preference of operators and miners alike. These men agree that 7-B maintenance costs are lower, their cutting speeds are greater, they keep well ahead of modern loading units, are easier to handle, safer to operate. Big mining developments are standardizing on the 7-B. These Shortwall Cutters, typical of the long list of Sullivan achievements in mining, drilling and related equipment, are the product of the best in modern metallurgy, machine design and precision manufacture. If you want to know more about 7-B, or see it in action, write today to your nearest branch office. SULLIVAN MACHINERY COMPANY, Michigan City, Indiana. *In Canada:* Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

PRODUCTS

Coal Mining Machines • Scraper Haulers • Rock Loaders • Hoists • Car Pullers • Air Compressors Coal Drills • Rock Drills • Cutter Bit Sharpeners and Heaters • Core Drills and Core Drill Contracting

SALES OFFICES

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Denver, Colo.	San Diego, Calif.	Grantham, Lincs, England
El Paso, Texas	San Francisco, Calif.	
Huntington, W. Va.	Salt Lake City, Utah	

THREE SULLIVAN 7-B SHORTWALL CUTTERS CUT MORE THAN 753,000 TONS OF COAL IN 1942

Average Total Maintenance for 3 Years' Service . . . 1¢ per Ton!

A SULLIVAN 7-B AT WORK

Because of the length of the bar and the speed of cutting—the 7-B throws out so much bug dust that it sometimes requires three men to shovel it back.

Also at the Sheridan-Wyoming Mine—Sullivan CD-16 Rubber Tired, Self-Propelled Coal Drill for Modern Trackless Mining.

SULLIVAN

Modern Machines for Every Mining Method

I'll Guard the home front

—against the forces of GENERAL WEAR

"HARCOTE" is ready! Ready to protect softer steels against the ravages of wear — to help you keep machinery on the job — now — when replacement parts are so difficult to obtain.

P&H "Harcote" is a hard surfacing electrode — both *hard* and *tough!* It's ideal for refacing parts subject to severe wear and abrasion, such as shovel teeth, scraper blades, farm implements, sand and rock handling equipment, and many other applications on carbon steel, low alloy and high manganese surfaces. "Harcote" is just one of the family of P&H Alloy Electrodes which answer every welding need. P&H representatives will gladly assist you. Or write us for literature and procedures.

Ask also for information about P&H Arc Welding Machines.

P&H Alloy ELECTRODES

ARMY E NAVY

A new star has been added to P&H's award for excellence in war production.

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HARNISCHFEGER CORPORATION

WELDING ELECTRODES · MOTORS · HOISTS P&H ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.

How to Get Extra Life and Efficiency From Electrical Wires and Cables

1

STORE CABLES IN A COOL PLACE—High temperatures tend to break down rubber. Stored in a cool (not cold), uniform temperature, cable insulation is kept in the best condition for the longest possible life. Always avoid extreme temperatures.

2

KEEP REELS AND COILS OFF GROUND — Continued moisture rots wooden reel heads and fibrous cable coverings. Sound reels are easier to handle and well-preserved cable coverings give longer life in service.

3

PROTECT CABLES FROM WEATHER — Sunshine, light, rain, snow and freezing can hasten deterioration of rubber sheaths and fibrous coverings. Keep cables under cover. Otherwise, be sure to keep lagging on reels.

9

SPLICES WILL LAST LONGER when protected by a coating of weatherproof paint.

10

PROTECT THE JOINTS OF CABLES IN MANHOLES from fire by proper fireproofing.

11

UNDERGROUND INSTALLATIONS (without ducts) — keep ground saturated with water to lower earth temperature and dissipate heat more readily.

12

TUNNEL INSTALLATIONS — ventilate tunnels with grills where possible or install a blower at one end of the tunnel to force hot air out. Make sure circulation goes all the way through tunnel so hot air does not pile up at one end.

13

DUCT INSTALLATIONS — when possible circulate cool water through or flood duct lines and keep manholes flooded. But be sure your cables are water-tight.

14

EAR HEATING UNITS or hot pipes, move ...e wiring or insert baffles between steam ...pes and cables to deflect hot air from the ...ables.

15

HOT LOCATIONS — Cut air vents in the ...or or partition above cables to provide ...equate circulation by means of natural ...ersion or install fans.

16

...RCT CABLES for evidence of mechani... ...ation at conduit edges and for ... deterioration and abrasion. Eliminate ... by retaining cables and apply... ...ective paint.

17

VENTILATE POLE RISER CONDUITS and create circulation by making openings near the top or by leaving space between the conduit and pothead. This can improve the efficiency of an entire circuit.

18

SPACE YOUR CABLES as close together as possible on overhead circuits if you need to reduce reactive voltage drop. Leave sufficient space for air circulation to prevent overheating.

19

PROTECT cords from being run over by heavy moving equipment, dragged around sharp corners, yanked to remove kinks.

20

SHIFT cords and cables away from high voltage equipment and sparking motors. Such machines generate ozone which attacks rubber and hastens its deterioration.

21

DON'T run cords and cables over small diameter pulleys or drums. Continued bending and flexing around a short radius breaks the conductors. Use larger diameter pulleys.

22

WIPE cords regularly so they are free from oil, grease and chemicals. Such agents attack rubber.

23

KEEP cords out of light and sunshine as much as possible when in use. Light tends to harden rubber — thus hastening cracks.

24

MOVE cords away from steam lines, furnaces and hot objects. High temperatures damage rubber.

...e insulation will then last longer with the ... conductor load, or more current can be carried in the same cable without shortening its life.

...ture of the surrounding air (ambient temperature)

Get this Handy Wall Chart FREE!

Now, when electrical wires and cables are difficult or impossible to replace, it is more important than ever that your electrical maintenance men take good care of your wires and cables to secure maximum life and efficiency. This handy wall chart will show them how to do it.

We will be glad to supply, free, as many reprints of this chart as you require.

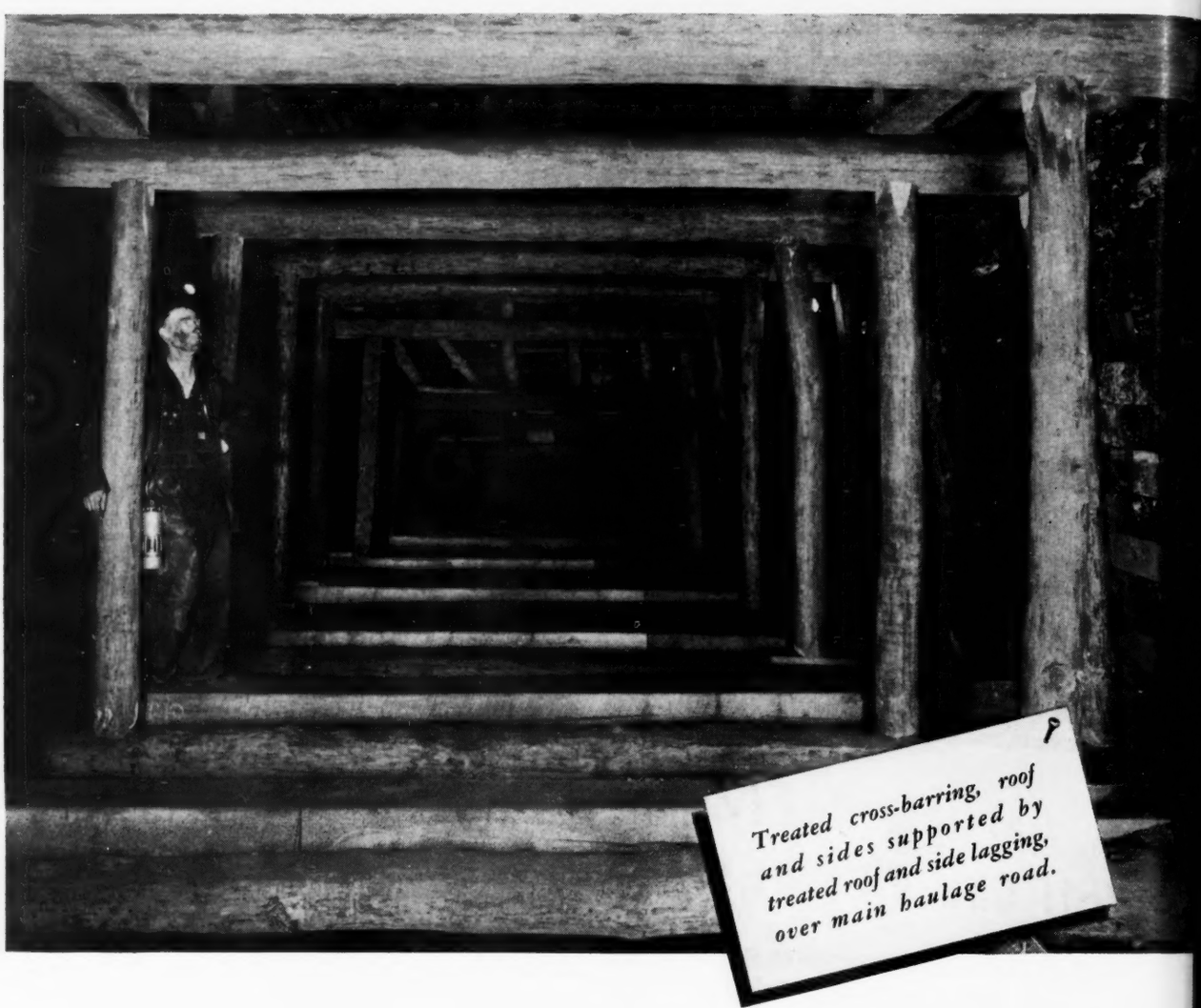
THE OKONITE COMPANY
and HAZARD INSULATED WIRE WORKS DIVISION
Executive Offices: Passaic, N. J.
Offices in principal cities

PRINTED IN U.S.A. 304 43-3230 BULLETIN OK—3219

THE OKONITE COMPANY OKONITE **PASSAIC, NEW JERSEY**
OFFICES IN PRINCIPAL CITIES

3219

BUY U. S. WAR BONDS *Every Payday All Okonite Employees* BUY U. S. WAR BONDS



Treated cross-barring, roof and sides supported by treated roof and side lagging, over main haulage road.

HOW YOU CAN CHECK DECAY ...ADD LONG LIFE TO ROOFS

FUNGOUS GROWTHS that attack wood flourish in the humidity of the average mine. They decay timbers—rob them of their natural strength. But Du Pont "CZC" battles timber decay by checking its main cause—fungi. Makes timbers last many times longer.

In addition, Chromated Zinc Chloride treated wood resists fire—reduces hazards. It is free from odor and clean to handle.

Check up on "CZC" treated wood for *all* your construction. There is ample preservative and treating capacity to meet both military and essential industrial needs. Learn the dividends "CZC" pays in longer timber life, added safety and savings in time and maintenance costs.

Write for your *free* copy of "Wood Preservation for Mines." E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington, Del.

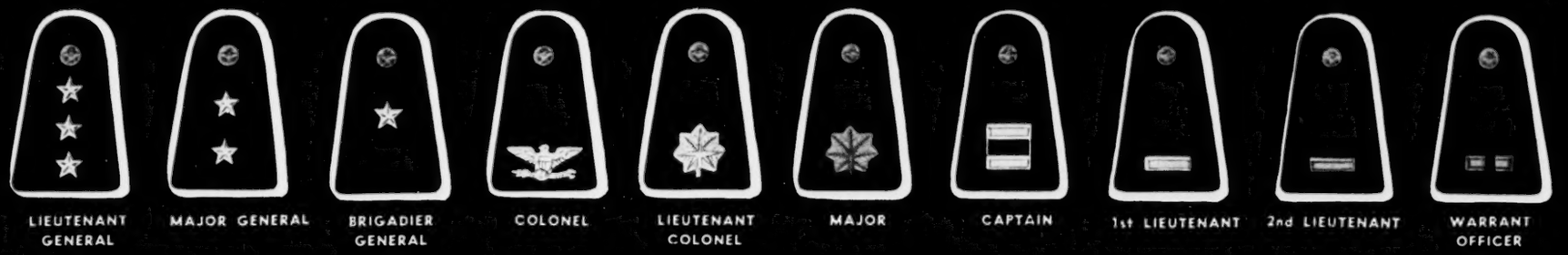
DU PONT
REG. U.S. PAT. OFF.

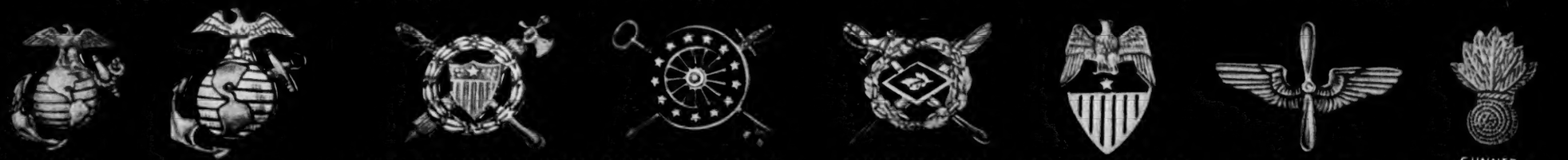
CZC

CHROMATED ZINC CHLORIDE

WOOD PRESERVATIVE

BETTER THINGS for BETTER LIVING . . . THROUGH CHEMIST



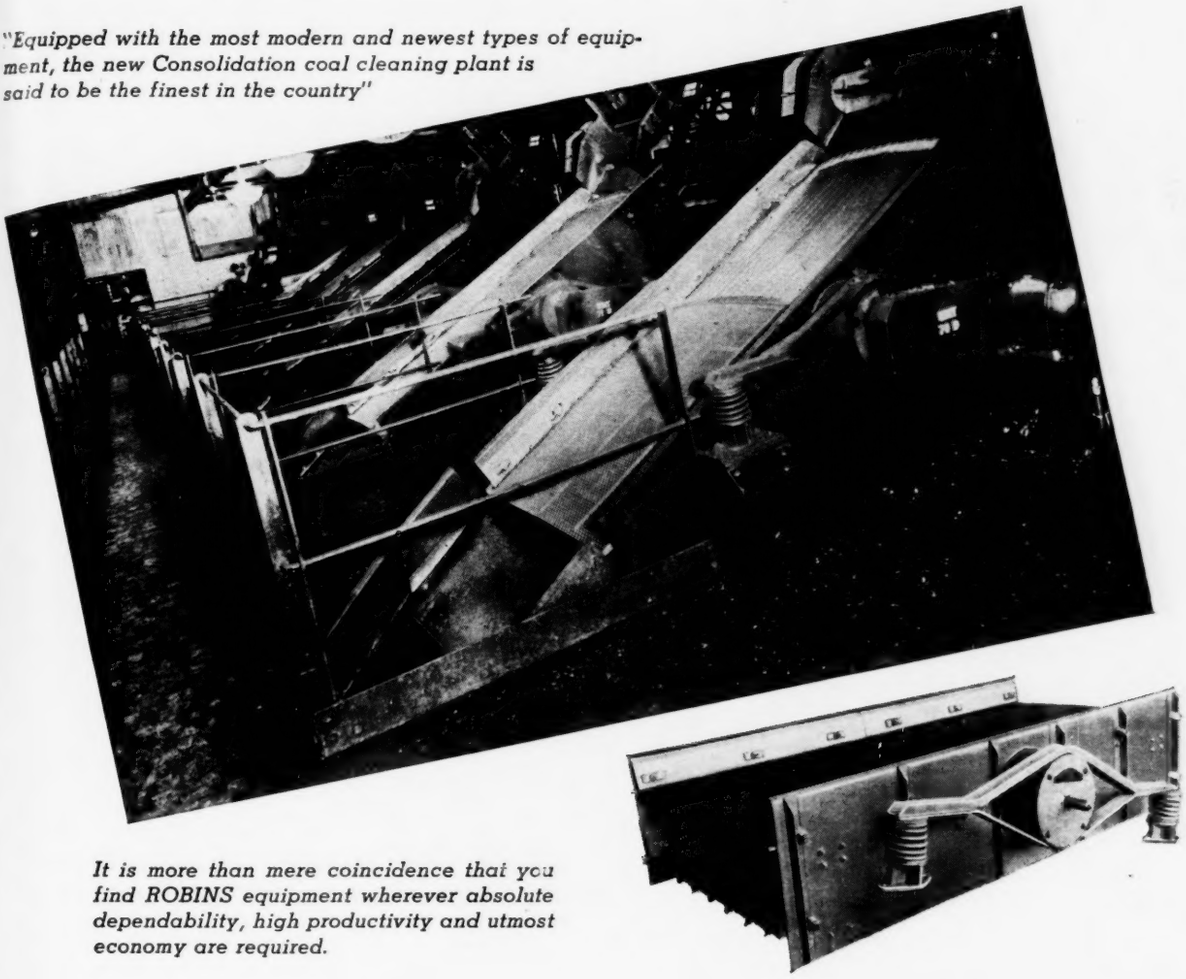


BUY U. S. WAR BONDS — REGULARLY EVERY PAY DAY

© 1942 by Thomas R. Diver
The Louis Allis Co., Milwaukee

THE LOUIS ALLIS CO. MILWAUKEE, WIS.

"Equipped with the most modern and newest types of equipment, the new Consolidation coal cleaning plant is said to be the finest in the country"



It is more than mere coincidence that you find ROBINS equipment wherever absolute dependability, high productivity and utmost economy are required.

ROBINS Vibrex Screens are made in two types: Style J for suspended mounting, 24"x48" to 24"x72" single deck only, and Style M for floor or suspended mounting, 36"x78" to 48"x120" single or multiple decks.

AT the new Consolidation Coal Co. plant in Jenkins, Ky., ROBINS Vibrex Screens perform two important operations. Three-way separation of 1¼"x0" raw coal for dry cleaning is completed on five double-deck Vibrex Screens. Refuse from cones is desanded and dewatered on two additional units.

Vibrex Screens are part of a complete line of materials handling machinery designed, manufactured and (if desired) erected by ROBINS. In addition to Vibrex Screens for fine sizing, there are Eliptex Screens for coarse sizing and Gyrex Screens for heavy-duty sizing and scalping. For other divisions of coal handling operations, there are ROBINS Mine Conveyors, Belt Conveyors, Apron Conveyors, Picking Tables, Vibrating Chutes, Crushers, Feeders, Bucket Elevators, Loading Booms, Grab Buckets, Car Hauls, Bridges, Towers and complete Storing and Reclaiming Systems.

An extensive assortment of Bulletins gives details of these various units. If you wish more information, tell us the subject. If you want maximum efficiency and productivity in all your coal handling operations, get your equipment from ROBINS.

For Material Aid in Materials Handling

It's ROBINS

Whatever your interest in coal operations—mining, selling or consuming—you can increase speed, advance efficiency and promote economy by entrusting your handling problems to ROBINS.

ENGINEERS • FABRICATORS • ERECTORS

ROBINS

CONVEYING BELT COMPANY

PASSAIC • N. J.

MATERIALS HANDLING MACHINERY

4 WAYS to get more service from WIRE ROPE

Yes, wire rope is tough. It can stand up to the most rigorous service—and ask for more.

But that's no reason to abuse it. With a little care, by applying a few simple rules, you can get a tremendous amount of extra service from your rope.

1 Break it in with light loads

For example, when breaking in a new rope, don't slam on full power and speed right off the bat. Begin with fairly light loads. Operate at moderate speed. Give the strands of the rope a chance to seat down snugly and uniformly upon the core, so that each strand is carrying its fair share of the load. This way, the rope will assume its proper "constructional stretch" without damage, and you'll be assured of better spooling and easier handling throughout the entire life of the rope.

2 Treat it with consideration

After the rope is broken in, you can safely use whatever speeds and loads it was designed for. But don't be unnecessarily rough, even then. A smooth, gradual application of power is just as efficient as slamming into the load with a jerk. The same is true of braking. It's the heavy jerks and surge loads that beat the guts out of a piece of rope. Nine times out of ten these can be avoided without losing time.

3 Know your rope

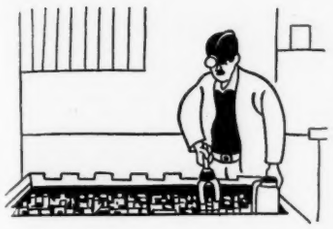
For example, if you're using a flexible 8-strand rope for high-speed work, don't overload it. This rope is built to withstand bending fatigue and fast operation—not for heavy hogging lifts. The opposite is true of heavy-duty 6-strand rope. Lift with it—but don't try to break speed records.

4 Right maintenance means plus service

Don't neglect the few simple maintenance precautions which require so little time yet return so much in extra service. Keep your rope properly lubricated. Don't operate it over sheaves that are abraded, damaged, or out of line. Fasten clips in the approved manner. Cut off a short length from the drum end of your rope from time to time so that "grief spots" are relocated over sheaves and drums.

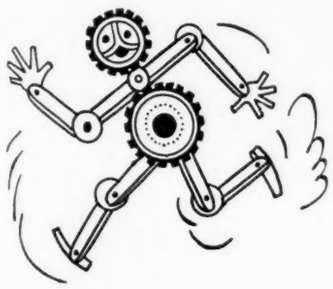
Wire rope is now a war weapon. Its proper use is a service to your country and to yourself. If you want good, dependable rope, and friendly service, get in touch with the Bethlehem Wire Rope distributor in your territory. He's always ready and willing to serve you.

Bethlehem Manufactures Wire Rope for all Purposes



Equipment Saver! Because they can be charged directly from the d-c line, alkaline batteries save motor-generator equipment. Faster charging means, too, that fewer charging circuits are needed.

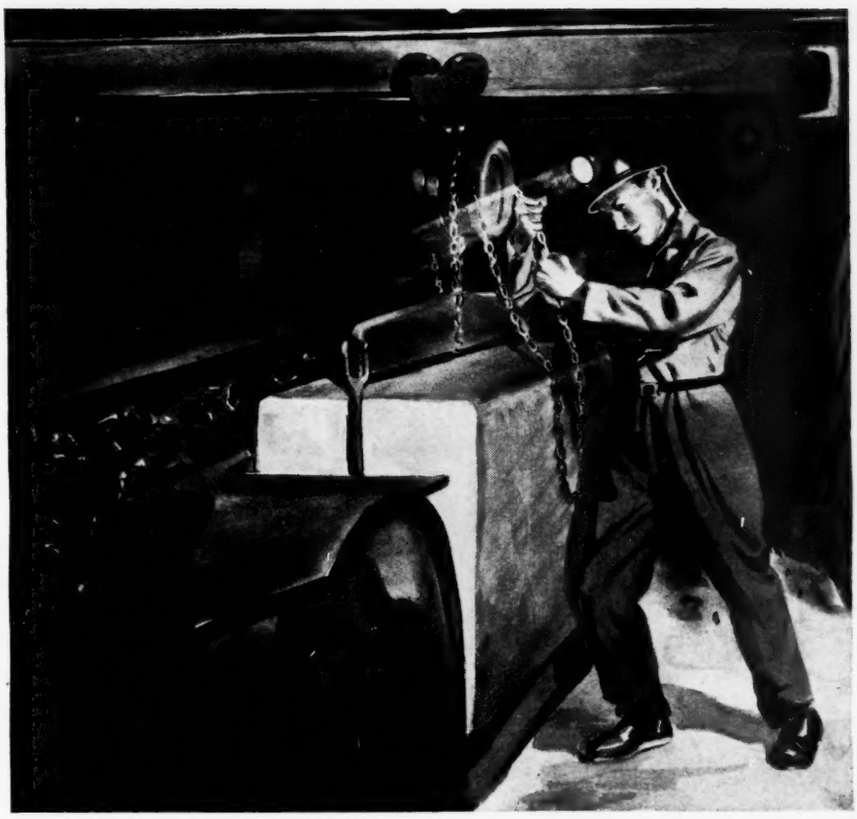
They Learn Quicker! Your shop's no different. There are many new men in the electrical departments of all mines. But maintenance of an alkaline battery is readily learned because the requirements are simpler, the hazards fewer. It's a man-power factor worth remembering.



Increased Mechanization! Increased underground mechanization automatically calls for improved haulage, if production efficiency is to be consolidated. That's why alkaline batteries are a good buy in war or peace. Their suitability to the job and their reliability in performance are perfect allies of modern equipment.

Edison Storage Battery Division
Thomas A. Edison, Inc.
WEST ORANGE, N. J.

POWER TO CARRY ON



The ability of a mine to produce is in great part dependent upon the adequacy of the haulage equipment—to get what is below the ground above the ground. When haulage units are powered with alkaline batteries, production capacity grows in two ways.

First, the dependability of the alkaline battery provides haulage subject to less threat of interruption—therefore improves production. Second, the characteristics of alkaline batteries are such that they provide more available power to the mine. Alkaline batteries can be charged rapidly—in 6 to 7 hours, and without equalizing. This means they can be fully charged in off-peak hours—that you can charge when you are not hoisting, therefore, can avoid adding the haulage load to the hoisting load.

MINING NEEDS THE DEPENDABILITY OF

Edison Alkaline BATTERIES

Handle with Care

—it's got to last!

THIS year your wire rope must be made to last as long as possible. It must do more work. Must work longer hours. It must deliver more service than ever before. Only with proper care can this be accomplished.

American Tiger Brand Wire Rope has long life and service built into it. No other rope will last longer under tough usage. Or is easier and safer to use. But even a quality rope like U·S·S American Tiger Brand requires care and attention to give the maximum service and top efficiency required right now.

Send for this Free Booklet

Every user of wire rope can get a lot of good ideas from this informative book. It's packed with easy-to-follow instructions. Pocket-size, handy and thoroughly practical, "Valuable Facts" will help you avoid common errors of handling and care that shorten rope life. Order as many copies as you need. Get them into the hands of the right men. Never forget—wire rope is indispensable to the war effort—you've got to make it last.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York

Excellay Preformed

UNITED STATES STEEL

Strip Coal Mines Equipped with WALTER TRACTOR TRUCKS had a Head-start on the War Emergency!

LONG before the war emergency, mines using WALTER Tractor Trucks had the answer to today's two big problems: First, producing greater tonnage and second, keeping hauling equipment on the job —avoiding breakdowns under extra-shift operation. The tremendous power-plus-traction of Walter 4-Point Positive Drive permits hauls up to 55 ton payloads in any weather, any running conditions, on any grades. WALTER Tractor Trucks are built like a battleship — specially engineered and constructed throughout for gruelling service. They keep going day after day, under conditions that stop anything else on wheels. Write for literature and learn more about WALTER Tractor Trucks.

FEATURES OF WALTER TRACTOR TRUCKS

- **AUTOMATIC LOCK DIFFERENTIALS** proportion the torque to each wheel according to its requirements at any instant.
- **SUSPENDED DOUBLE REDUCTION DRIVE** reduces unsprung weight, gives higher ground clearance, saves wear and tear on truck and tires.
- **SCIENTIFICALLY CORRECT WEIGHT DISTRIBUTION** with engine forward, short wheelbase, easy maneuvering.
- **TRACTOR TYPE TRANSMISSION,** 14 to 1 range, with 6 speeds forward, 2 reverse, fast high gear, powerful low gear Powerful diesel or gasoline motors.

WALTER MOTOR TRUCK CO.

1001-19 Irving Ave., Ridgewood, Queens, L. I., N. Y.

PARTS AND SERVICE FOR WALTER TRUCKS

Consult your local Walter distributor for expert repair service and genuine parts to keep your Walter Trucks in top running condition.

for MAXIMUM CAPACITY IN MINIMUM SPACE

Interchangeable

WITH SINGLE-ROW BALL BEARINGS

NORMA-HOFFMANN

PRECISION ROLLER BEARINGS

NORMA-HOFFMANN BEARINGS CORP'N.,

STAMFORD, CONN., U. S. A. • *Founded in 1911.*

Write for the Catalog. Let our engineers work with you.

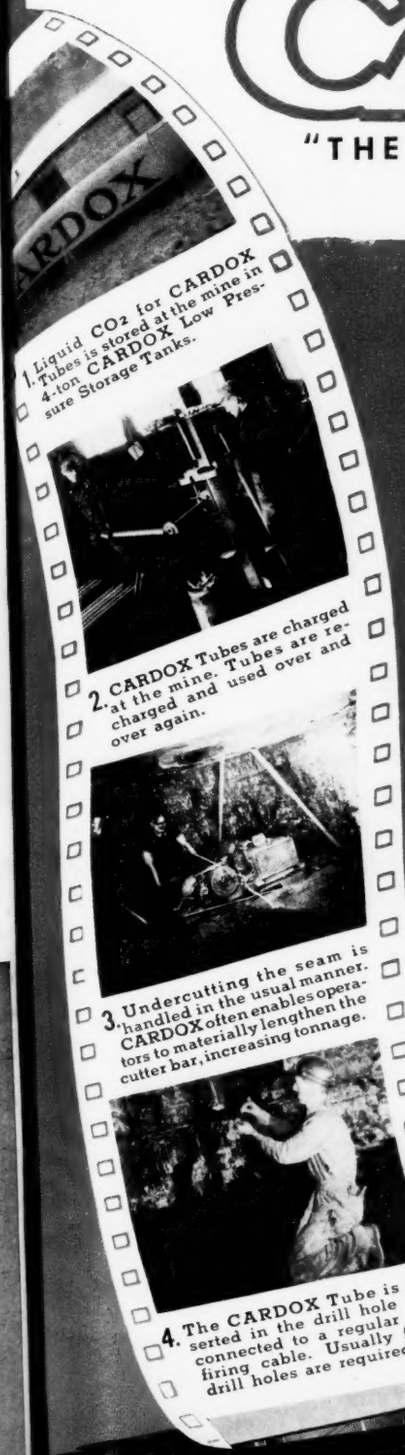
Their solid cylindrical rollers provide maximum contact area, giving larger load and shock-absorbing capacity than any other single-row bearing of like dimensions. Thus, when NORMA-HOFFMANN PRECISION ROLLER BEARINGS are used in place of ball bearings, a greater factor of safety is provided, together with added life, particularly under vibration and overload. PRECISION qualities in workmanship and materials adapt them alike for both low and high speeds.

A TONNAGE MOVING PICTURE

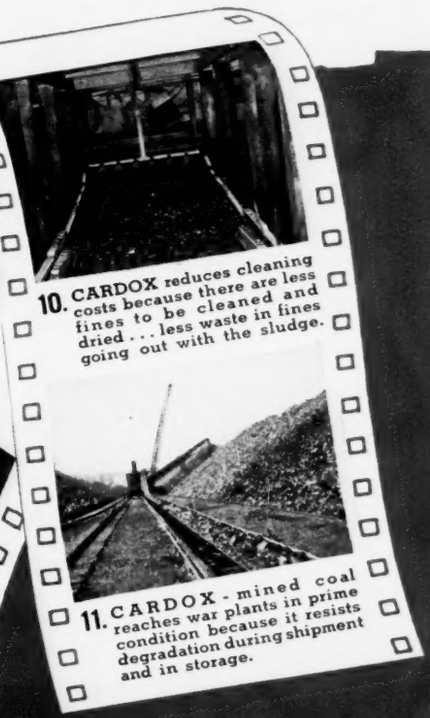
of

CARDOX

"THE NON-EXPLOSIVE MINING METHOD"


1. Liquid CO_2 for CARDOX Tubes is stored at the mine in 4-ton CARDOX Low Pressure Storage Tanks.
2. CARDOX Tubes are charged at the mine. Tubes are recharged and used over and over again.
3. Undercutting the seam is handled in the usual manner. CARDOX often enables operators to materially lengthen the cutter bar, increasing tonnage.
4. The CARDOX Tube is inserted in the drill hole and connected to a regular shot firing cable. Usually fewer drill holes are required.

8. From the loader to the railroad cars, coarse sizes remain coarse sizes.
7. CARDOX-mined coal will not crumble when subjected to extensive mechanical handling. It is remarkably free from shatter-cracks.
6. CARDOX rolls the coal out for easy loading, greatly increasing the efficiency and life of mechanical loading equipment.


10. CARDOX reduces cleaning costs because there are less fines to be cleaned and dried . . . less waste in fines going out with the sludge.
11. CARDOX - mined coal reaches war plants in prime condition because it resists degradation during shipment and in storage.

War production requirements and wartime labor problems put new emphasis on the effectiveness of CARDOX in getting the most tonnage with available men and equipment.

As CARDOX produces no smoke or noxious fumes, coal can be broken down just as fast as men or machines can load out the fall. By rolling out the coal for easy loading CARDOX reduces hand digging . . . keeps mechanical loaders productive more hours each shift. CARDOX-mined coal is not weakened by shatter-cracks . . . reduces handling, shipping and storage losses resulting from degradation.

Write or wire for details of free demonstration of CARDOX in your own mine.

CARDOX CORPORATION

BELL BUILDING • CHICAGO

7. The quantity of free (unabsorbed by plates and separat solution of the Wheat Battery when filled to the highest l is limited to one ounce **total** for **both** cells. The paten spongewood separators — a product of Wheat Laborato is responsible for this feature. While this is a negligible qu tity of free solution each cell is equipped with a positive n spilling device. Also the solution is dilute sulphuric a known to be harmless to a healthy skin, assuring no comp sation cases.

WHEAT

The Engineered Cap Lamp

Here are the features —

1 Two bulbs (one for emergencies) — miner is never in the dark.

2 Center mounted, Krypton-filled bulb, gives 20% more light — no dark "shadow spot" in beam.

3 Choice of 3 reflectors gives narrow concentrated beam, a medium beam, or a widespread beam of light — suits all working conditions.

4 Headpiece weighs less than 6 ounces, Lamp Cord 6 ounces, Battery 62 ounces — Total weight of Lamp complete 74 ounces.

5 Headpiece molded of strong bakelite; sealed, moisture-proof and dust-proof.

6 Rubber battery case — non-conductor of electricity — a valuable safety feature.

7 Battery solution (free) limited to one ounce total both cells.

8 Lead-acid type battery maintains high voltage throughout shift (80+% efficiency) — year after year.

9 Battery charged through headpiece and cord of cap lamp — a daily test of all connections.

10 Designed for self-service charging system for lowest lamp-house operating cost.

11 To charge, headpiece is simply slipped on to key in charging rack, and turned to make contact. Nothing to take apart — unit-sealed construction.

12 A payment plan (purchase or rental) to meet the requirements of companies — large and small.

The Koehler Flame Safety Lamp has two outstanding features that insure protection in the mine.

FIRST — Better Ventilation.

SECOND — Greater GAUZE AREA, for increased sensitivity.

"Wheat Mine Lamps are the only Mine Lamps 'powered' by Exide Ironclad Battery Plates made by The Electric Storage Battery Co., The World's Largest Manufacturers of Storage Batteries for every purpose."

Write today—

WHEAT LAMP SALES, INC.

1501 Kanawha Valley Bldg., Charleston, W. Va.

SPECIALISTS IN MINE LIGHTING FOR 25 YEARS

KOEHLER MFG. CO.

Marlboro . . . Mass.

2 MINES OF 1 COAL COMPANY
equipped for War Production

DELIVER WASHED COAL CAPABLE OF MORE BTU'S PER HOUR

Prepared fuel to predetermined sizes and with impurities removed increases heat transfer and decreases ash content. The removal of non-combustible material conserves railroad carloading capacity and motive power, so important to war production.

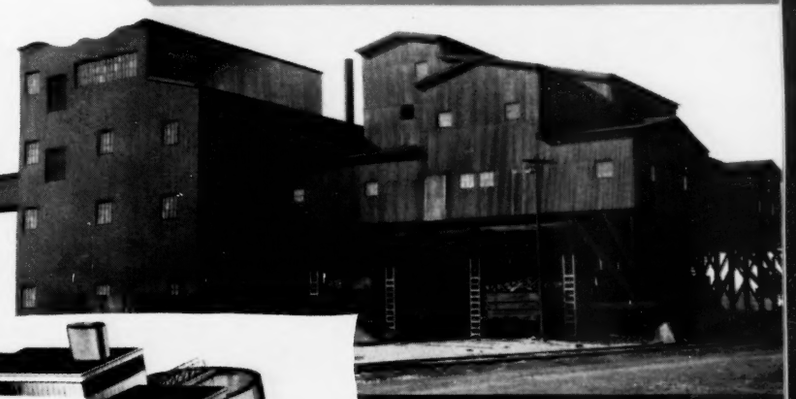
PRODUCE MORE TONS PER HOUR WITH FEWER MEN

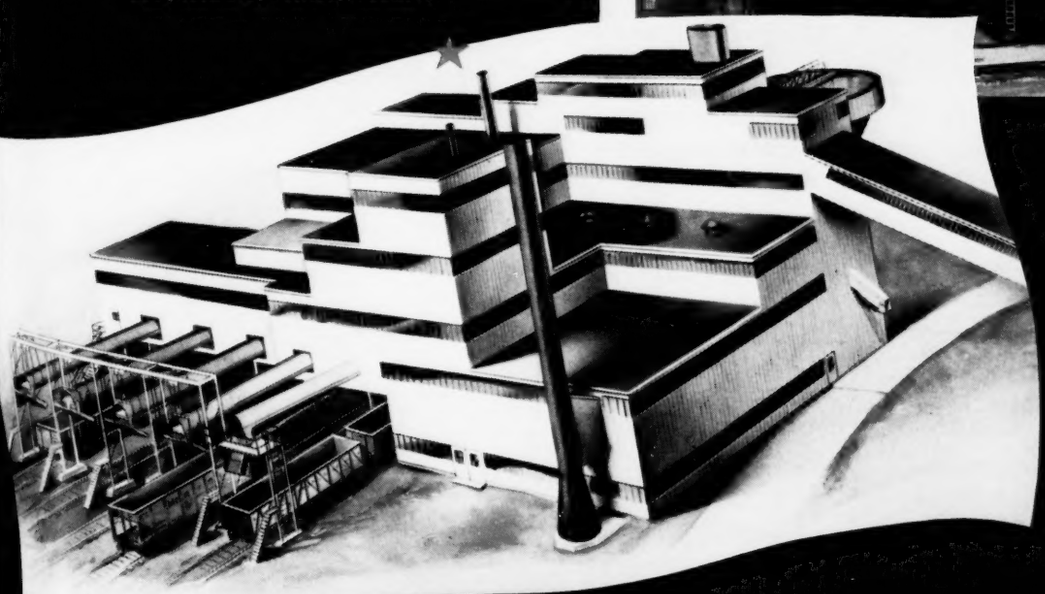
In many installations of only one of our mechanical cleaning devices from 25 to 35 men, formerly employed in hand picking prepared sizes of coal, are released for underground work or other vital war industries. That's really manpower conservation!

AYRSHIRE PATOKA — 400 TPH

FAIRVIEW—the newest installation—700 TPH

Both plants including the equipment completely designed, manufactured, and erected by McNally Pittsburg.





IN PEACETIME

McNally Pittsburg equipped mines will have two distinct advantages: (1) They will experience little sales resistance to their product, and (2) lower operating cleaning costs will place them in a better position to meet stiff price competition.

every operating hour 23,000 tons of washed coal come from McNally Pittsburg equipped plants.

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

Main Office and Works
Pittsburg, Kansas

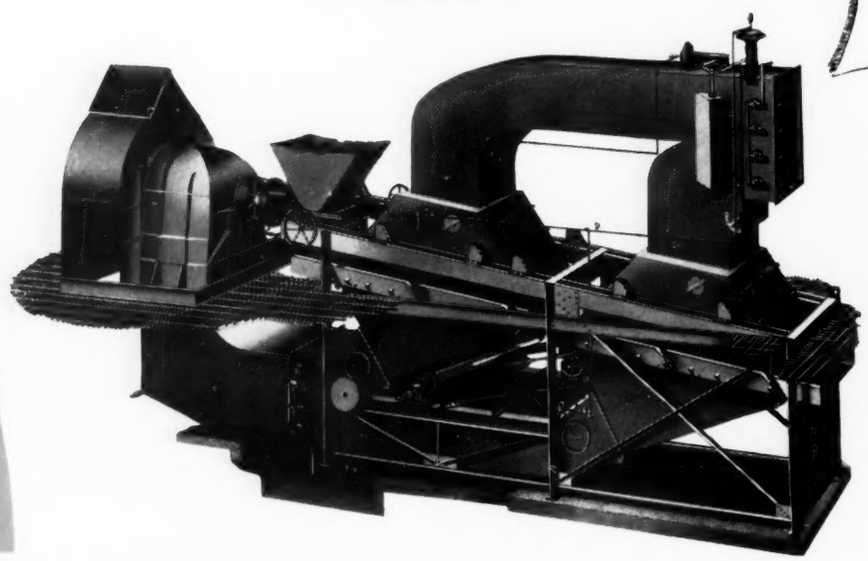
GENERAL SALES OFFICE
307 N. Michigan Ave., Chicago

Eastern Office
Koppers Bldg., Pittsburgh, Pa.

THE HEART AND SOUL of "Topside" Merchandising...

★ Washing and drying produces the mechanically prepared coal for which there is an ever increasing demand. The washer and dryer units illustrated here are capable of turning out, at low mechanical cleaning cost per ton, huge tonnages per hour of the quality buyers demand.

You can simplify your manufacturing processes . . . carry on with fewer men . . . improve your market condition . . . boost your sales of screenings and establish your entire operation on a highly profitable all-year-round basis. Our engineers are at your service for consultation and advice.



McNALLY-NORTON WASHER

McNALLY-VISSAC DRYER

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

Main Office and Works
Pittsburg, Kansas

General Sales Office
307 N. Michigan Ave., Chicago

Eastern Office
Koppers Bldg., Pittsburgh, Pa.

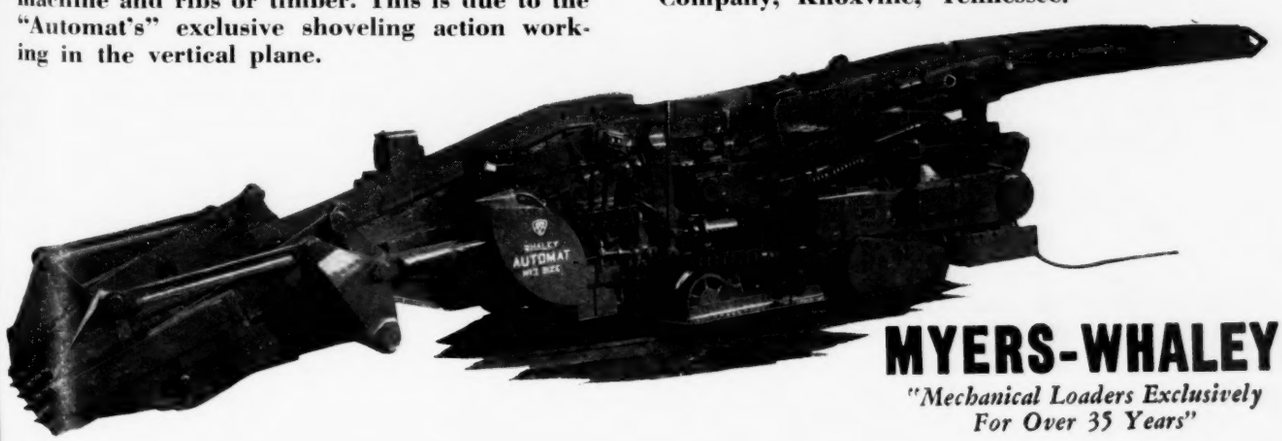
If He Can Use a Shovel— He Can Operate an "AUTOMAT"

If those younger men you have depended upon to operate your loaders, in your mechanization plan, are leaving for the fighting front, you need the "Automat" more than ever. You need it because of its smooth and easy operation . . . because any one of those good, steady men—men who have been with you so long—can satisfactorily operate the "Automat" with complete safety.

If he can use an ordinary hand shovel, he can, with average intelligence, operate an "Automat". Only the touch of a lever is necessary to guide its action. Even in the hardest kind of service, there is no jerking, side kicking or danger of being caught between machine and ribs or timber. This is due to the "Automat's" exclusive shoveling action working in the vertical plane.

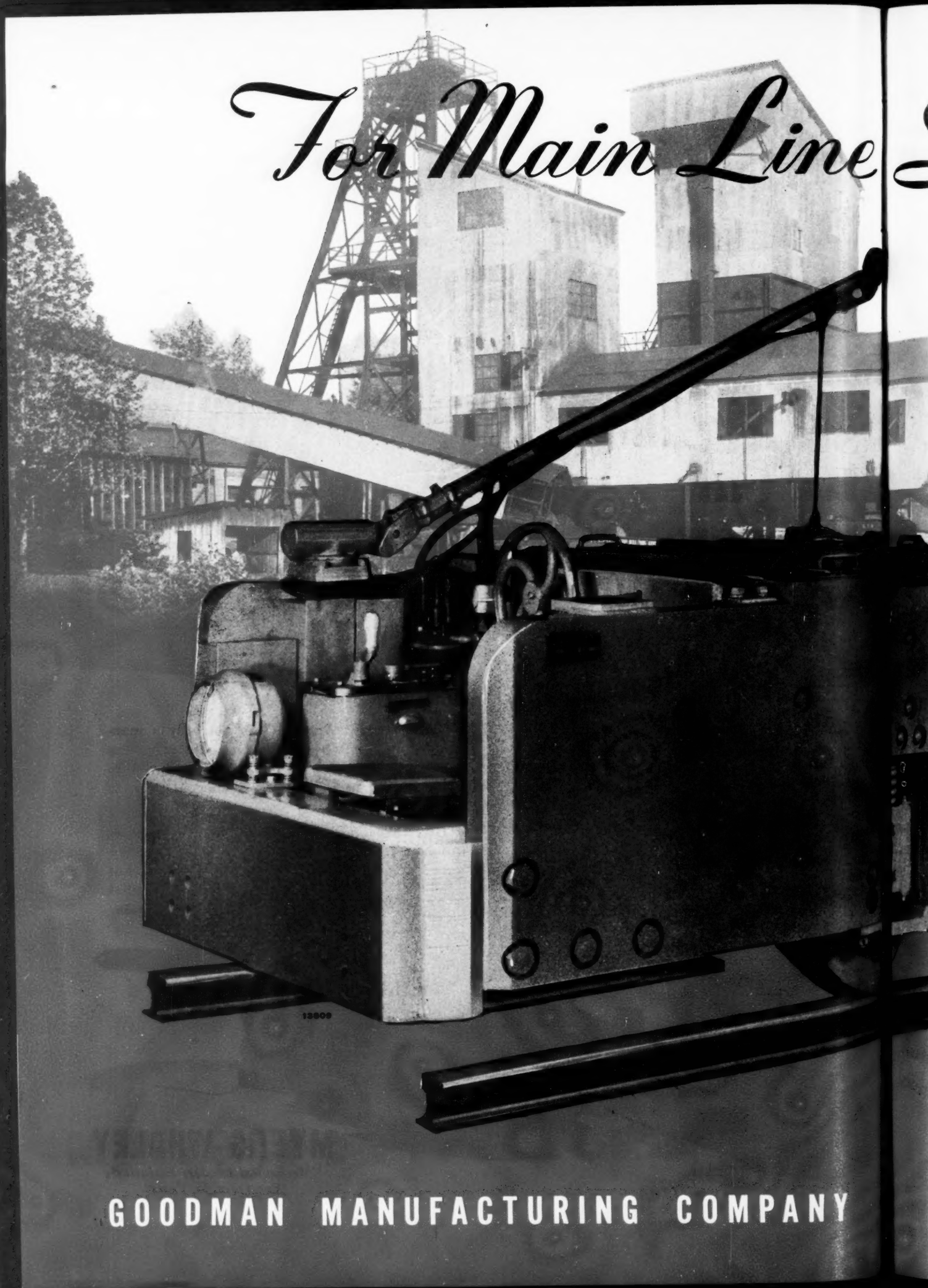
The Whaley "Automat" is not only a manpower saver but because of its ease of operation and the slight manual effort required to run it, the "Automat" is an energy saver as well.

Give that dependable man of long service an opportunity. He may not be a mechanic . . . he may not be a model of physical perfection, but 9 to 1 he will get you the big production that the "Automat" is capable of. Myers-Whaley Company, Knoxville, Tennessee.



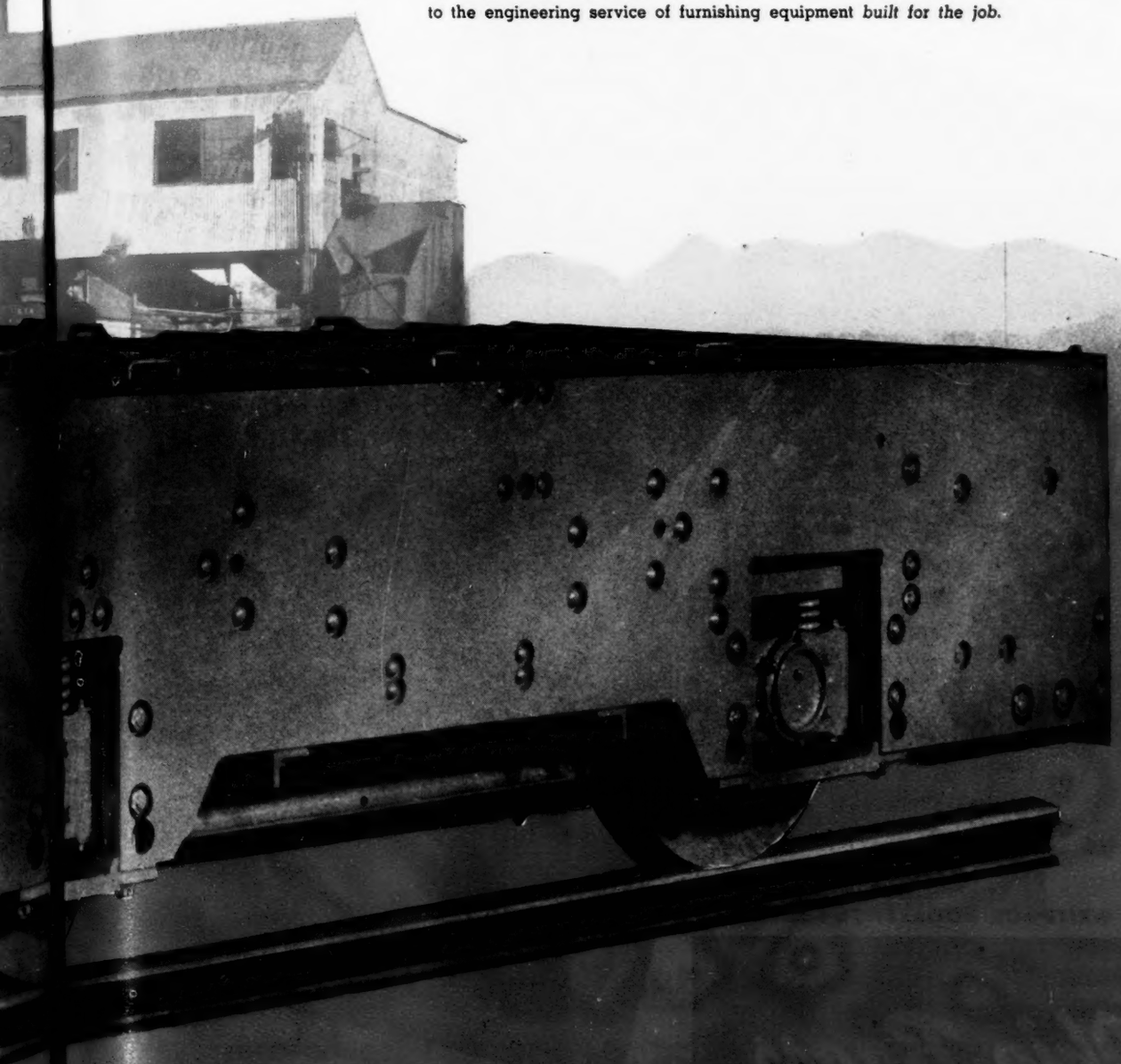
MYERS-WHALEY

"Mechanical Loaders Exclusively For Over 35 Years"


For Main Line
13809
GOODMAN MANUFACTURING COMPANY

Service Underground

This Goodman 10-ton trolley locomotive has the rugged construction, adequate motor ratings and heavy duty controls that insure the continuity of operation which is indispensable to hi-speed haulage. It is another locomotive, of the complete Goodman line, that conforms to the engineering service of furnishing equipment *built for the job.*



HALSTED STREET AT 48TH • CHICAGO, ILLINOIS

TWO SIMPLE STEPS

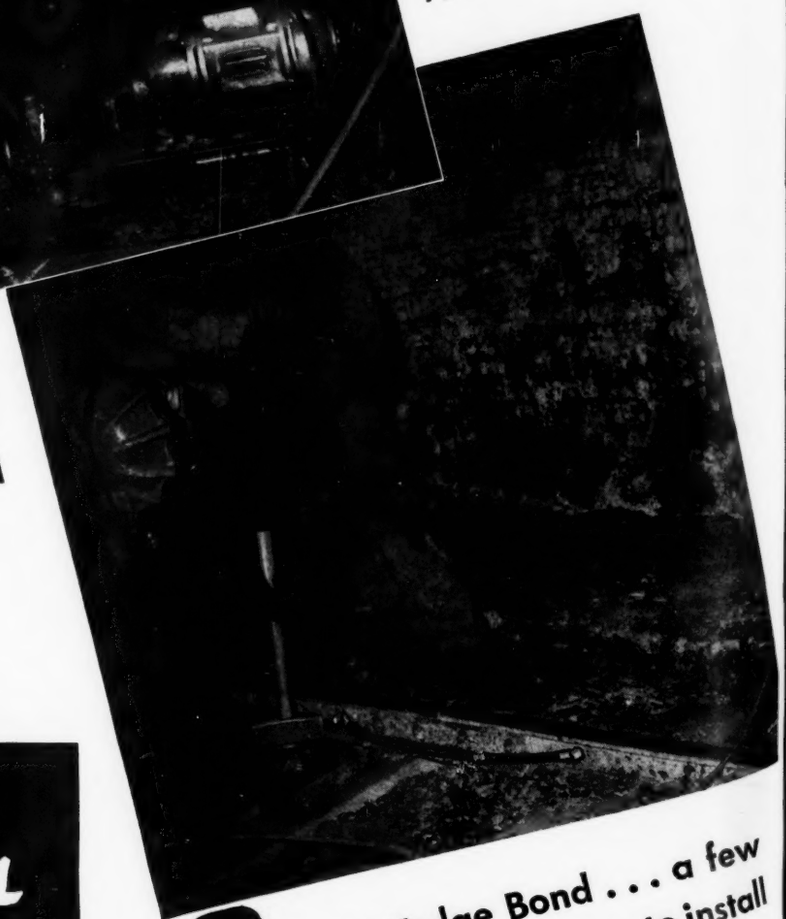
TO SOLVE YOUR BONDING MANPOWER PROBLEM

No Skilled Welders Necessary

Provides Continuous, Copper, Low-Resistance Path

Bonds Applied Two to Three Times Faster

1 O-B Electric Mobildrill ... bores proper hole in rail quickly and efficiently.



2 O-B Wedge Bond ... a few hearty hammer taps to install in a permanent mechanical and electrical joint.

WRITE FOR BOOKLET 764-M.

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

KEEP BUYING WAR BONDS

2373M

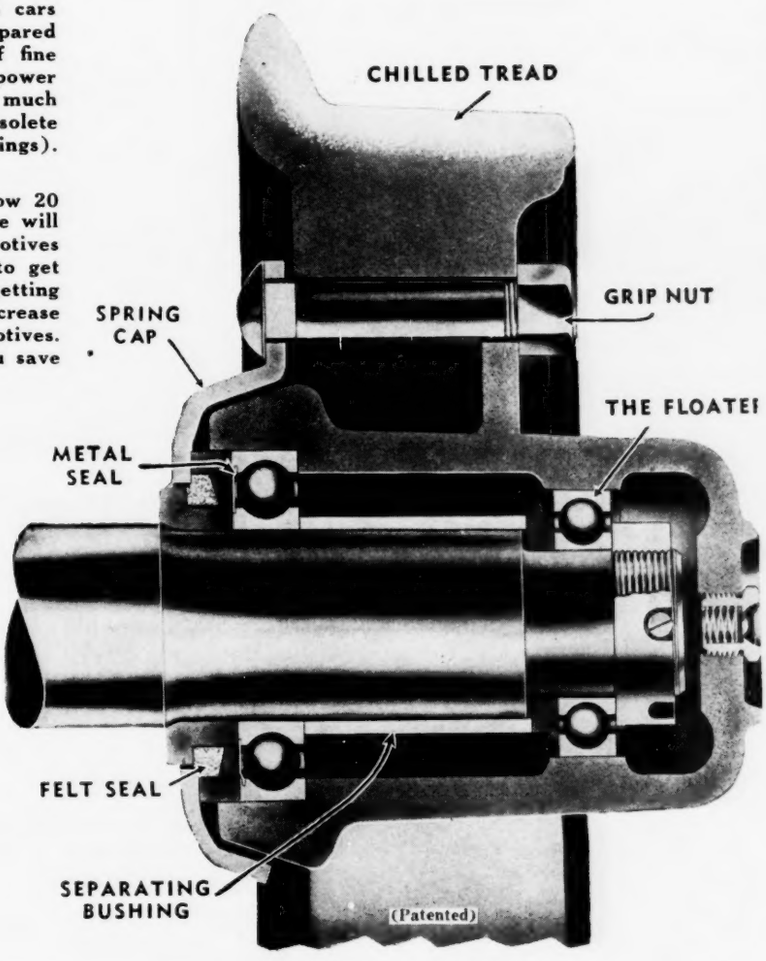
Need Another Locomotive QUICK?

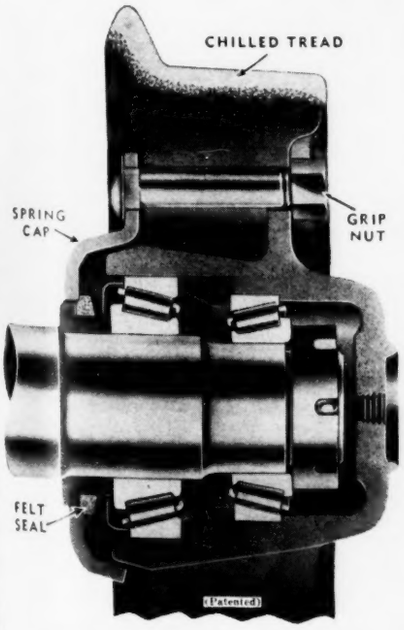
Here is one way to get it and probably the quickest at the least cost! Replace the wheels on your cars with S-D "Floater" Ball Bearing Wheels and TWO of your locomotives will do the work of THREE.

★ Don't question the above suggestion, because Independent Engineers' Tests have proved that you can increase the pulling capacity of a locomotive almost 50 per cent when cars are equipped with S-D "Floaters" as compared with wheels equipped with other types of fine precision bearings, and with no increase in power consumption (saying nothing about the much greater advantage when compared with obsolete wheels having plain or non-precision bearings).

For example, if your maximum trip is now 20 cars, install "Floaters" and your locomotive will pull 30 cars. If you are using two locomotives and think you need another one quickly to get three 20 car trips, where you are now getting two, install "Floaters" and you'll get the increase in 30 car trips with your present locomotives. You save a hard-to-get locomotive . . . you save manpower.

IN ADDITION . . . "Floaters" are guaranteed in writing against breakage or bearing failure for 5 years. Furthermore, if you have to grease them more than once in five years, we pay the extra cost. You need these remarkable wheels for increased production, for saving time, money, and manpower.





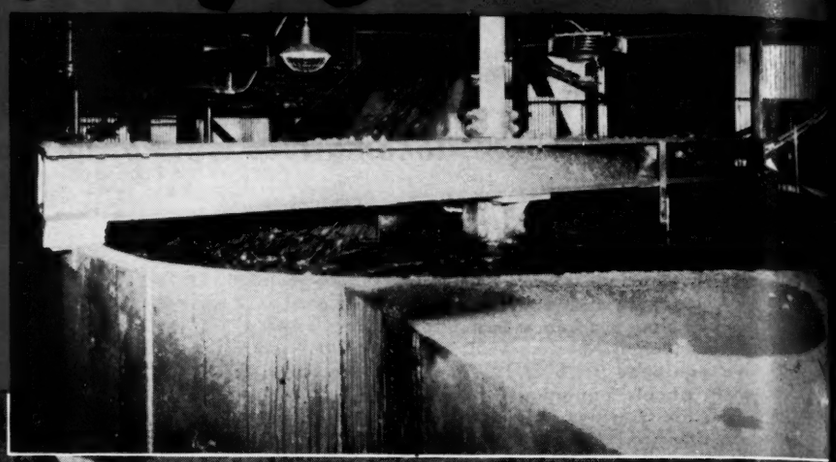
THE S-D TIMKEN BEARING EQUIPPED WHEEL

Like "Floaters", this new wheel has the closed hub, is quickly and easily demountable, and when demounted bearings remain in perfect original adjustment on axle. The castings are the same scientifically designed and built castings as those for our "Floater" wheels and produced under our patented annealing process.

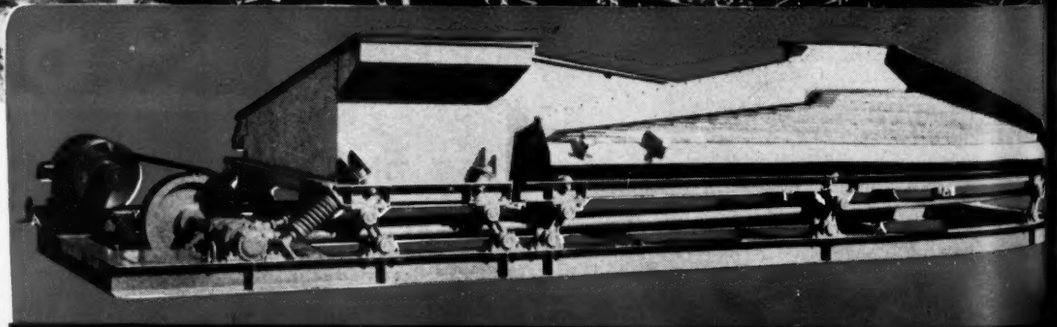
REPLACEMENT WHEELS. Our replacement wheel division will give special attention to your orders for Repair Wheels.

***Sanford-Day Iron Works*, KNOXVILLE, TENNESSEE**

Quality Coal at



Chance Flotation Cone at Consolidation Coal Company



American "Twin Dex" Air Tables at Consolidation Coal Company

FAIRMONT MACHINERY COMPANY . . . Engineers, Designers and Erectors of Complete Preparation Plants, offering all types of preparation equipment . . . wet and dry cleaning systems, shaker and gravity screens, picking tables, loading booms, conveyors, feeders, car hauls, chutes, etc.

High Capacity

in a wide range of sizes for metallurgical . . . by-product . . . gas . . . steam . . . and domestic use

FROM ONE FAIRMONT PLANT

• The modern, fully equipped new plant designed and built by Fairmont handles the output of three Consolidation Coal Company mines—replaces two former tipples—has a rated capacity of 725 tons per hour but has, at times, produced at a higher capacity.

Two cleaning systems are used—the Chance Flotation Process for two sizes—one 5" x 1¼" the other 1¼" x ⅜" coal. Four American "Twin-Dex" air tables dry clean two smaller sizes—two tables handle ⅜" x ⅛" coal the other two handle ⅛" x 50 mesh.

The particular features of washing, cleaning, sizing and blending incorporated in this plant were adopted to obtain the maximum benefits of the mechanical mining of the three mines and to maintain the high standard of preparation for which Consolidations Cavalier Coals are recognized throughout the industry.

Fairmont has both the organization and experience to engineer, design and erect a new plant to meet expanded preparation requirements—to rejuvenate your present plants so that they will produce more—to consult with you on the method best suited to your coal production.

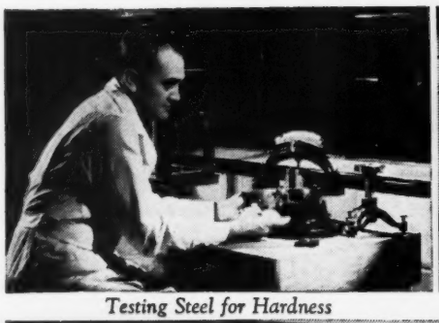
Call on Fairmont to help you produce better coal, faster for our vital war needs.

CONSOL
CAVALIER
Reserve

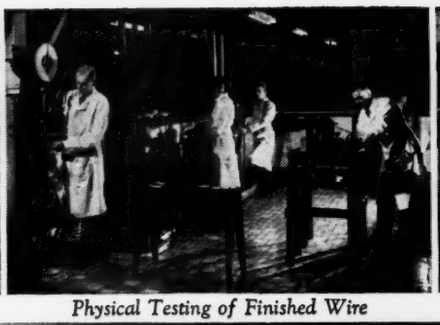
TRADE MARK REGISTERED

FAIRMONT MACHINERY COMPANY

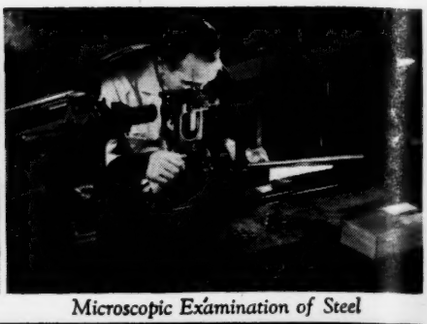
FAIRMONT, W. VA.



Testing Steel for Hardness



Physical Testing of Finished Wire



Microscopic Examination of Steel

A Section of Union Wire Rope Research Laboratory

★Another 6 Months of Star Performance In War Production

Tuffy Can Take It!

BIRTHPLACE OF TOUGHNESS

Out of some 4000 steel formulas, relatively few are suited to wire rope making. From long years of experience, Union Wire Rope engineers and metallurgists have determined upon a steel formula for each type of Union Wire Rope.

To be certain each heat meets specified analysis, steel is examined under a powerful microscopic photo and scanning machine (see photo at top right). In minute detail its micro structure and inherent grain size are analyzed. From this analysis is determined the controlled heat-treatment and the subsequent processing operations it is to be given in the mill to secure wire meeting the exact specifications desired.

Samples of the wire then are brought back into the elaborate Union Wire Rope laboratory. First it is subjected to hardness tests under a delicate pendulum machine (see left photo above) and its Brinell hardness determined. Then in a group of six physical testing machines (see photo at top center) the actual tenisle strength, torsional values, fatigue life, ductility and hardness of wires of all grades and sizes are checked. Here, before the wire is stranded, the ultimate tensile strength, toughness and durability of Union Wire Rope is pre-determined.

Many other research activities are constantly carried on in Union Wire Rope's laboratory. Although not pictured here, there are scientific research machines for testing wire coatings by the salt spray, Preece, strip test and wrap test methods.

Here tough wire is born and on long lines of stranding machines (many of them designed by our own engineers) it grows into Union Wire Rope of maximum strength and greater toughness to withstand harder use and longer service.

UNION WIRE ROPE CORPORATION
2130 Manchester Ave., Kansas City, Mo.
Tulsa • Houston • Chicago • Salt Lake City • New Orleans • Monahans Portland • Ashland, Ky. • Atlanta

SEND FOR ROPE DOPE • Tells how to make wire rope last longer—how to handle and install it—how to socket or splice—and a wealth of other helpful information.

WHEN YOU NEED PREFORMED WIRE ROPE SPECIFY **union-formed**

*B-43

union *Wire Rope*

"THE ULTIMATE LOW COST WIRE ROPE"

...to get proper production costs you must learn to keep your shovel busy with your transportation and preparation equipment. But before you can load, crush and prepare your coal you must first shoot it.

National "Slim-ite" Powder Series (No's1-2-3) for the overburden in Strip Mining are new and revolutionary. The formulae of these powders are not one year old. But each month they are going on new Strip properties and proving their economy.

National Powder Company's ten Permissibles are new formulae for Deep Mines. More than Eleven Million pounds of National Permissibles have been used in Indiana, Kentucky, Ohio, Pennsylvania, Virginia, and West Virginia."

● *Following tables as of United States Bureau of Mines approved list:*

Permissible	BRAND	VELOCITY	CARTRIDGES PER 50 LB. CASE
High Speed	National "A"	9800 ft./sec.	1¼ x 8 — 142
	National "B"	12100 ft./sec.	1¼ x 8 — 160
	National "C"	10200 ft./sec.	1¼ x 8 — 225
Medium Speed	National "D"	7900 ft./sec.	1¼ x 8 — 140
	National "E"	91 0 ft/sec.	1¼ x 8 — 160
Low Speed	National "F"	6600 ft./sec.	1¼ x 8 — 230
	National "F"-1	5700 ft./sec.	1¼ x 8 — 250
	National "G"	5600 ft./sec.	1¼ x 8 — 200
	National "H"	5100 ft/sec.	1¼ x 8 — 180
Permissible Gelatin	Napcogel No. 1	15000 ft/sec.	1¼ x 8 — 103

These Powders are for Anthracite and Bituminous Mines
See our Catalog data in Coal Mining Catalogs

POWDER NATIONAL COMPANY

Not living on our reputation but building it.

NATIONAL POWDER COMPANY

ELDRED (McKean County) PENNA.

MANUFACTURERS OF HIGH EXPLOSIVES FOR ALL INDUSTRIAL PURPOSES

THINGS ARE

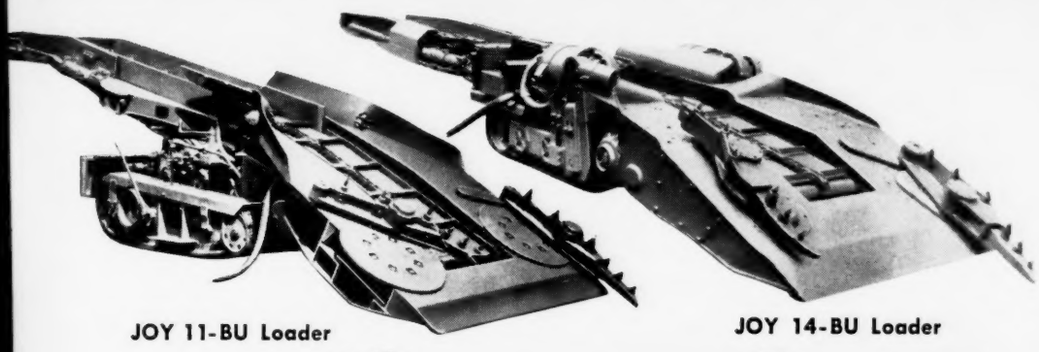
U. S. Navy Official Photo,
through Underwood & Underwood

Things are moving today —the methods of yesterday are in the discard for good. Coal is Industry's Ammunition—boost your output by installing Joy Mechanized Equipment. The experience and advice of Joy Engineers are available at your request.

...AND JOY IS

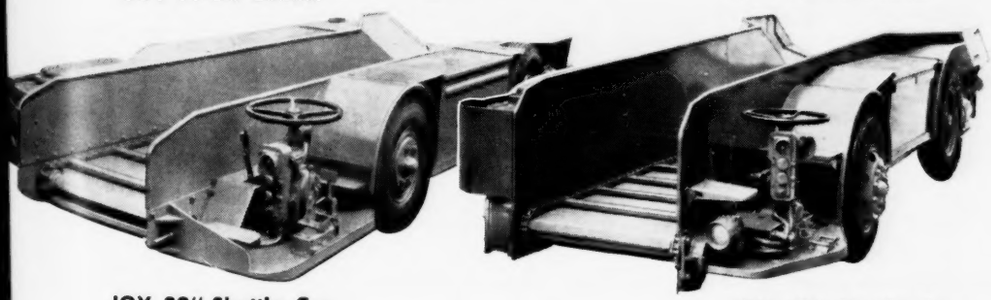
MOVING . . .

U. S. Army Signal Corps Photo,
through Underwood & Underwood



JOY 11-BU Loader

JOY 14-BU Loader



JOY 32" Shuttle Car

JOY 42" Shuttle Car

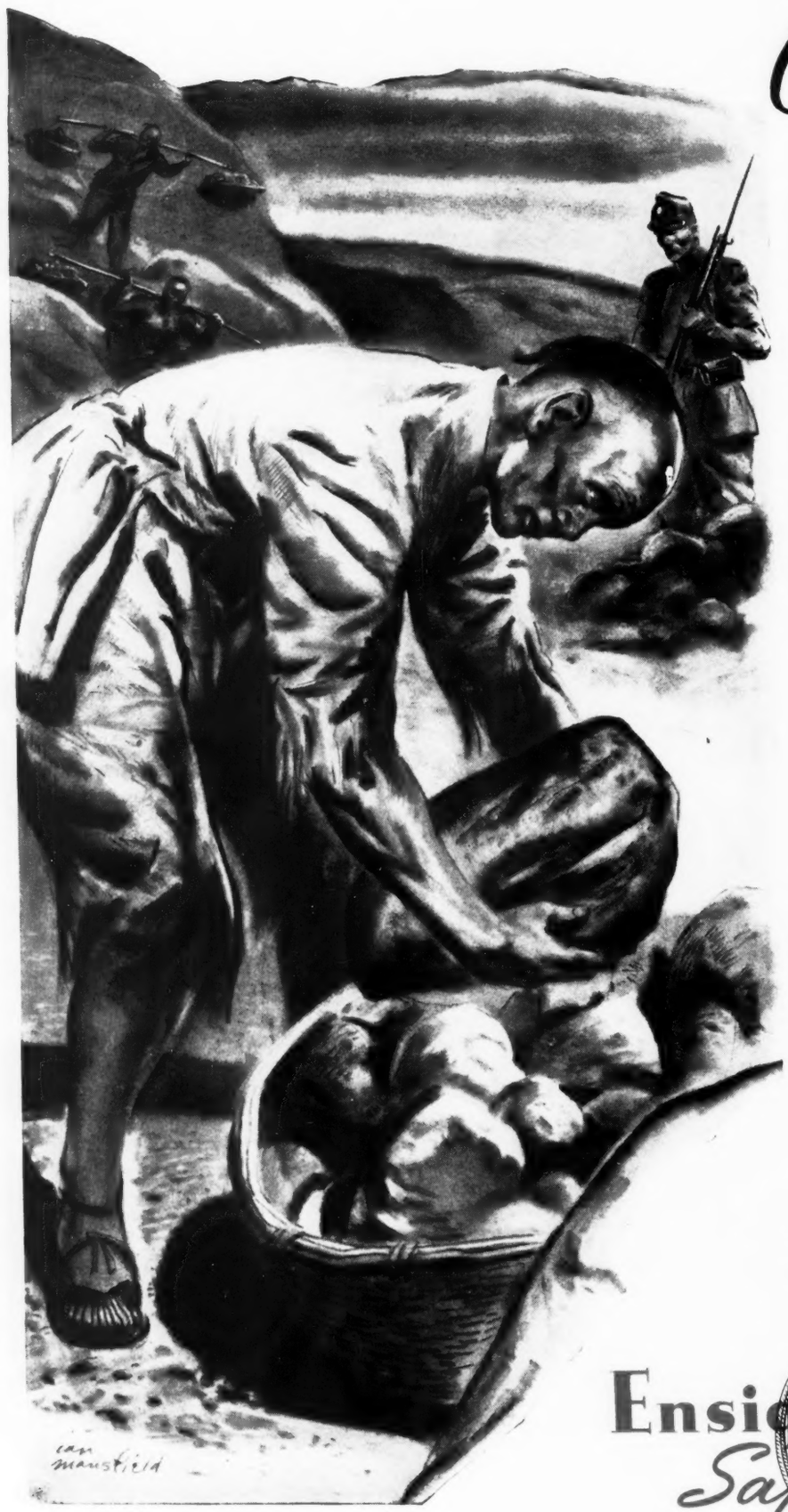
MOVING COAL

JOY MANUFACTURING COMPANY

FRANKLIN, PA.

We take lessons from you

Chan!



YOURS is a weary task and a bleak existence, Chinese friend, as you toil on a highway for the inhuman Japs. They think themselves your masters—but they're not! For they can't enslave your soul, or break your patience, or kill your will for final victory. We take a lesson from you, Chan, as you look down the highway where victorious armies will march—your armies and ours.

For the war is over here, too—on sea and land, above and below. Deep down in pits and mines, skilled men are drilling and blasting. They send to the smelters the coal and ores from which planes and tanks and guns are born.

To speed the work of these determined men, and to provide for their safety, the Ensign-Bickford Company is manufacturing Safety Fuse and other trustworthy blasting supplies. We are with these miners and for them, as we have been for over a century. We know, as do they, that *Victory Begins Underground!*

THE ENSIGN-BICKFORD CO.
SIMSBURY, CONNECTICUT

Ensign·Bickford
Safety Fuse

Food—The Deciding Issue

Our food problem remains to be solved

THE first thing the Germans did when they occupied Czecho-Slovakia, Poland, Belgium, France—was to empty all warehouses. Everything went into trucks headed for Germany.

The Nazis knew that this war would be won by the army that had the most supplies and the best supply system.

The Nazis knew that supplies are as essential as guns. They knew that the most essential of all supplies is . . . food.

Being the only people on earth who can watch women and children starve, the Nazis seized upon food as their most powerful instrument for disciplining the masses. They added famine to their arsenal of conquest.

The flocks and herds of Europe are being consumed with alarming rapidity. The desperate shortage of meats and fats is growing steadily worse. Our Allies are short of certain foods that we must supply if we expect them to carry on.

And as we supply them, as our imports are curtailed, as our fighting men consume more than they do in civil life, and as we fail to increase our production rapidly enough . . . we, too, become short of certain foods.

Former President Herbert Hoover, speaking before a conference of the Governors and Representatives of twelve Mid-Western farming states in Des Moines on March 15th, sounded the warning that American agriculture, beset by Washington bungling on manpower, farm machinery and price systems, strangling production and distribution, is facing a deterioration which may bring on a national food shortage such as led to the collapse of Russia, the defeat of Germany in the first World War and the fall of France in the present war. Unless this deterioration is stopped, warns Mr. Hoover, we cannot hope to win the present conflict.

Complications of similar magnitude face the food processor and the distributor.

Never in the history of the world has man's dependence on food been so crucial. Yet it is not easy for us to grasp the full significance of the crisis. We are so accustomed to finding milk, eggs and butter on our doorsteps every morning, we are so used to filling our pantries from the shelves of our grocers and markets that we accept food as something that is due us on demand. We do not stop to think that we never are more than a few meals ahead of famine.

But this picture has changed. Now we are faced with food rationing, and every day the shelves of our food markets become more bare.

* * *

Let it be noted that the appointment of two Food Administrators has not solved the food problem. It is still with us; daily it becomes more critical. Unless it is solved, and solved quickly, the very food that ex-Food Administrator Wickard said would "win the war and write the peace" may lose the war and lose the peace.

Put very simply and clearly, the food problem amounts to this: we are trying to feed upward of 200 million people. We are trying to do it with the farms and other facilities that heretofore have been capable of feeding about 145 million people (our present population plus a 5% surplus).

Had the Government foreseen the need and planned ahead, we could have begun by 1941 the enlargement of our farm production and food processing capacity. Two irreplaceable years have been lost!

The gravity of the situation becomes apparent when we consider that 50,000 factories are required to process our foods. Food processing not only is America's biggest industry—it is one of America's most important for, without processing, most foods would perish before they could reach the consumer. The term "processing" covers the salting, drying, smoking, pickling, chilling, canning, packing and other methods of preservation that make it possible for us to eat in 1943 food that was produced in 1942. Few realize that most of the food we shall eat in 1943 was produced and processed last year, that most of the seed we plant this spring will grow food for 1944 or perhaps later.

In one important process of preservation, tin and rubber are vital materials. When the Japs captured Malaya and the Netherlands East Indies more than half of the world's tin and nearly all of its rubber fell into their hands. This forced drastic changes upon our entire food economy. The importance of tinplated steel containers, tops for glass jars and rubber gaskets is fairly obvious . . . metal food containers alone consume, every year, more than 2,700,000 tons of steel.

The aggression of Japan has snared our whole food industry in a maze of intricate packing problems. It has enforced recognition of a new principle of food technology, i.e., that the *method* of food preservation is determined by the *type* of container available. The tin, steel and rubber stringency compels many food processors to adopt

unfamiliar methods – methods that call for a great deal of new equipment. This, in turn, involves the use of critical materials that are so urgently needed for other war purposes.

This conversion of the food processing industry to meet these exacting restrictions has been greatly complicated by two factors that have increased its wartime burden. Indeed, it is these that provide the principal reason for civilian food rationing.

The first of these is the task of feeding our armed forces overseas. Allied ships are being sunk at an alarming rate and the loss of cargo is considerable.

The second factor gravely augments the first. Under Lend-Lease our country is undertaking to feed our Allies to the extent of approximately 60 million people.

Types of food required for Lend-Lease and the armed forces are the finest we can produce. They are the high protein foods, especially meats, cheese and milk; and the protective foods which rate high in vitamin content. Peculiarly enough, the more valuable a food is from a nutritive angle, the more specialized is the processing required to preserve it.

The food processing industry, handicapped as it is, is meeting today's challenge with resourcefulness and enthusiasm . . . despite container complications and shipping shortages.

This is the tenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

It is accomplishing its Herculean task by resurrecting and modernizing a method of food preservation that is as old as mankind. Probably you have read a great deal about dehydration. You actually may have eaten dehydrated food, but right now nearly every bit of dehydrated food is earmarked for the armed forces or for Lend-Lease.

Food processing never will be as spectacular as the production of bombers or tanks. But under today's conditions, the performance of the food processor is no less important . . . no less inspiring. When we consider that dehydrated food is compressed into solid blocks with a density nearly equal to that of coal, so that almost a whole meal can be carried in a vest pocket, and that half of the shipping space is thereby saved in transportation, we begin to appreciate what the processors have contributed to meet the food problem imposed by the war.

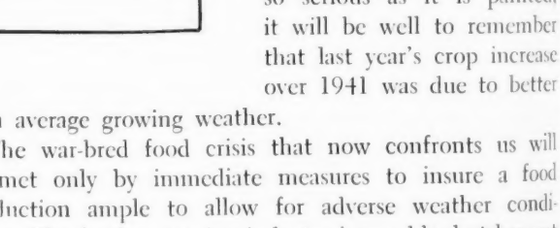
But they have not only contributed new methods, they are achieving new highs in production. And now they are asked to do what borders on the impossible. Consider dehydrated egg powder. Normal production in pre-war years was about 3,000,000 lbs. In 1940 this was increased two and one-half times, in 1942 it was stepped up again, this time forty-fold. And in 1943 the call is for another 60 per cent boost, to make a total of 480,000,000 lbs. Dried milk powder production of 350,000,000 lbs. in 1940 must be increased to 685,000,000 lbs. in 1943.

Vegetables, which were a small item to the processor before the war, now are dehydrated in enormous quantities. The vegetable dehydration industry has had to grow by leaps and bounds without benefit of the high priorities accorded to arms, ship and aircraft building. Production of dehydrated vegetables in 1942 was four times that of 1941, and 1943 calls for a sixteen-fold increase over 1942.

Total dehydrated food production in 1943 is scheduled at 1,750,000,000 lbs., dry basis . . . *all for export*. Multiply that by 10 and you have a rough approximation of the astronomical amount of raw materials that will have to be produced.

Many problems remain to be solved in the troublesome days that lie ahead. But with all his resourcefulness, man has little control over the weather. A severe drought could wipe out all of man's carefully laid plans. If we are tempted to reassure ourselves with the thought that the food situation probably is not so serious as it is painted, it will be well to remember that last year's crop increase over 1941 was due to better than average growing weather.

The war-bred food crisis that now confronts us will be met only by immediate measures to insure a food production ample to allow for adverse weather conditions. The food processing industry is capable, but has not been granted the needed help, in coping with its tasks. The food problem as a whole involves all three functions of production, processing and distribution. And if we are to master the problems that now beset us, all three of them must be coordinated under a single administrative control. "Food will win the war and write the peace". But if American food is to do that double job, we must develop a capacity for food *administration* comparable with the genius of our food industries.



President, McGraw-Hill Publishing Company, Inc.

COAL AGE

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

APRIL 1943

WHERE TO?

THE NEWS that the Appalachian agreements had been extended 30 days was an undoubted relief to many of those concerned, including government officials and the public—especially the latter. Whether it was merely a postponement of a showdown remained to be demonstrated, but such a showdown apparently was being invited by the miners' representatives if the content of many statements and the tone of their utterances were any criterions.

The postponement still left to be resolved the conflict between the ideas of the miners' representatives and those of operators and government officials, plus those of the public if opinions in newspaper editorials can be accepted as an indication. Perusal of the union demands and study of the course of the negotiations lend strong support to certain conclusions. One is that miners' representatives—and presumably the miners themselves, although that might be open to debate—have grown highly intolerant of opinion and reasoning contrary to their demands. One evidence was their reiterated opposition to inflation controls and other measures designed to protect the country' welfare in this period of emergency.

Another is the apparent increased disregard of how public welfare, not to mention the welfare of coal mining, would be affected by large wage increases and imposition of other conditions adding unnecessarily to cost. Prudence certainly dictates a due regard for the effect of excessive demands upon the price to the consumer and consequently the position of the industry.

Still another is the apparent determination of the miners—or at least their representatives—to move over into what heretofore has been accepted as the field of management. This is evidenced, among other things by demands for the inclusion of supervisors in the union and for the right to strike at coal mines as a means of putting pressure on suppliers and consumers to modify their operations and policies. Rather than cooperation toward a common goal, the union course smacks of dictation without acceptance of any of the responsibility.

If these conclusions are justifiable, and the evidence, as stated, tends to support them, the conflict referred to becomes understandable. Some other things become clear also. One is that miners have just as big a stake in the coal industry as the operators and should consider well before attempting to enforce demands which might jeopardize its ability to serve now and take advantage of the brighter future ahead.

RESERVE REQUIRED

COAL has pulled its share of the war load. But there is another winter and other months of war demands ahead when measures to alleviate the strain will become even more worth while. A good stock of coal above ground is one anchor to the windward. Ours needs building up even more and now is the time to start. Coal men can contribute by urging their customers to lay in supplies, telling them how to do it or referring them to such sources as U. S. Bureau of Mines Information Circular 7211 and even stockpiling themselves as far as practicable. Action now may save much grief later on.

LIFE PRESERVERS

HOW MANY men in or in charge of coal mines know what measures might be employed to preserve life if they were caught behind a mine fire or explosion? Of course, all possible measures to prevent mine fires and explosions should be the first line of attack. But at the same time it would seem that the miners themselves and the supervisors especially should know what to do. Proper barricading is a possible life preserver apparently not too well appreciated by coal-mining men. Required reading, therefore, should be Miners' Circular 42, U. S. Bureau of Mines, on this vital subject.

COAL'S NEW

"A new industry based on the use of coal looms on the not-too-distant horizon. In its establishment I hope soon to lend an official hand."

These striking words from Harold L. Ickes' frank article constitute one of the most significant statements on coal to come from a high government official in several decades of the industry's history.

As Petroleum Administrator, Solid Fuels Coordinator for War and Secretary of the Interior, Mr. Ickes is ideally equipped to appraise the nation's fuel position accurately and without bias. No other American, in fact, has available to him more factual data on our fuel resources.

As oil resources dwindle, the relative weight of coal and oil in the economic scale will change drastically. And coal, Mr. Ickes predicts, "will be used on a scale and for purposes never before seriously considered."

OUTSTANDING among drastic changes the present world conflict is bringing about in our way of living is the use of coal on a scale and for purposes never before seriously considered, even in its heyday as the nation's overwhelmingly preponderant source of fuel and energy.

The use of coal for new purposes and in ever greater quantities should profoundly vary our economic pattern. It scarcely can fail to increase the size and importance of many industries while creating new and powerful ones. Later, I shall discuss in some detail one new industry based on the use of coal which already looms on the not too distant horizon as a virtual necessity. In its establishment I hope soon to lend an official hand.

Many of the innovations and extensions in the future use of coal will stem from progressive diminishment of this country's oil reserves and the resultant increasing need of a substitute source from which petroleum-like products can be made. Others will be the logical outgrowths of expediencies thrust upon us by the war.

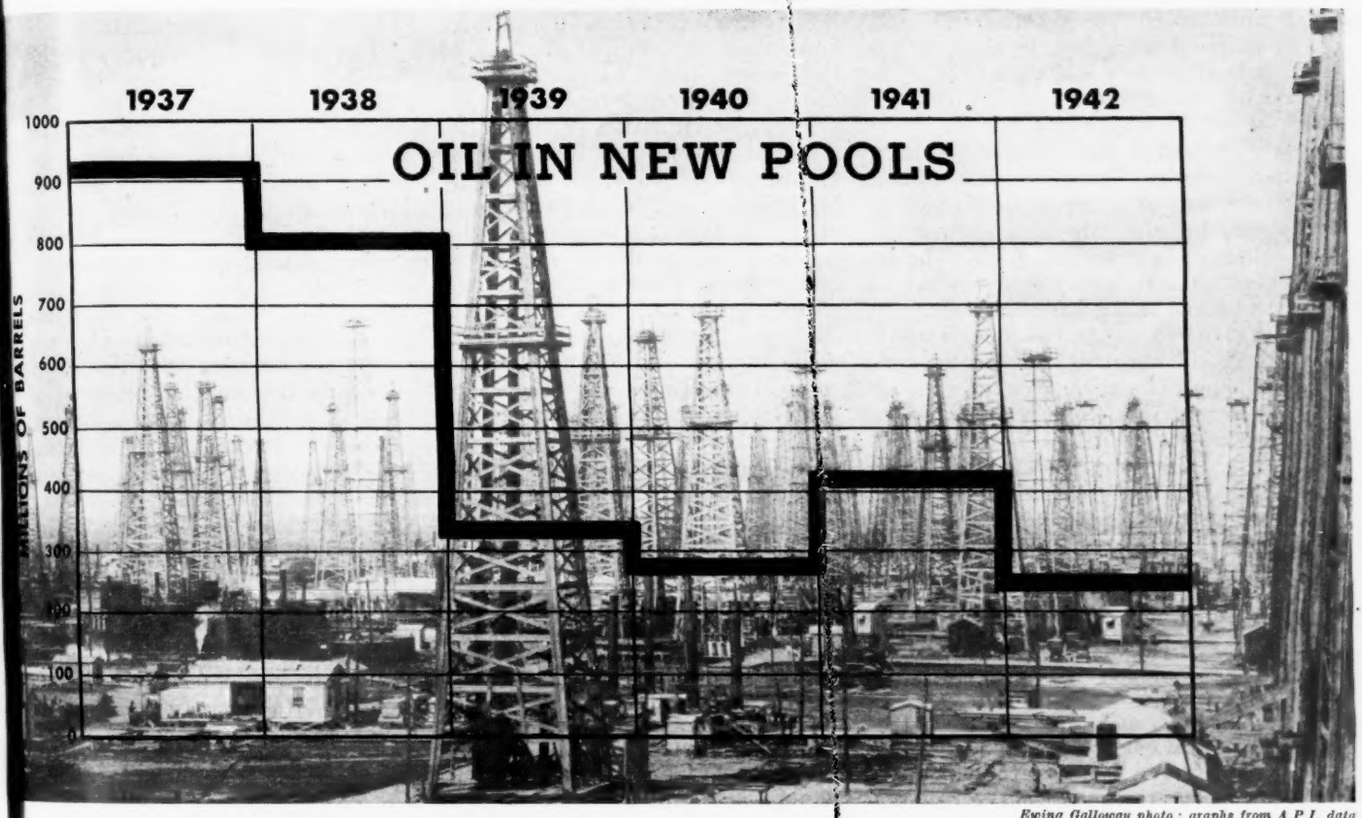
It requires no seer to foretell that the day is approaching when petroleum must be supplemented as an industrial and domestic fuel and as a source of gasoline. For the last several years petroleum consumption has been greatly in excess of the discovery of new reserves. For this reason it is prudent to look to coal and oil shale as sources of liquid fuel. I do not anticipate that a great quantity of liquid fuel made from coal or oil shale will be needed to make up for natural petroleum deficiencies within the next few years. But when and as it is needed we should be ready to produce it in whatever quantities are required. Again, as petroleum reserves diminish, plastics, chemicals, and explosives will be derived from coal in increasing quantities.

A detailed prognostication, however, carries weight only to the extent to which it is linked, logically and convincingly, with the past and present. Before we go further, then, we should ask the question: What are the facts in the history of coal which throw significant shadows on the future?

Probably the most important fact has been the continued discoveries, for many years, of new, prodigious petroleum reserves, coupled with the

HORIZONS

by HAROLD L. ICKES



Ewing Galloway photo; graphs from A.P.I. data

OIL RESOURCES NOT INEXHAUSTIBLE

"It requires no seer to foretell that the day is approaching when petroleum must be supplemented as an industrial and domestic fuel and as a source of gasoline. . . We must reserve the higher fuel values of petroleum for those uses which cannot be met so efficiently, if at all, by the direct combustion of coal. . . Ordinary common sense demands that we take positive action immediately to prepare ourselves to meet any exigency that may arise as a result of dwindling and possible disappearance of our oil reserves." The immediate need is "to develop, on a commercial basis, known methods of making liquid fuel from coal, lignite or oil shale."

perfection of cheap processes for refining it into liquid fuel. These wrought many changes in the pattern of the country's development and in the habits of its fortunate citizens.

Supplied with an abundance of relatively inexpensive gasoline, many Americans have been able, until recently, to satiate their inherent passion for rocketing from place to place at what once would have been considered an incredible speed. The physical pattern of our cities, the texture of our economy and our social customs reflect this extreme mobility. Until recently, too, many of us have found it as convenient as it was agreeable to play with a few gadgets and let our oil-burning furnace do the rest. Our security against attack and our ability to make swift and devastating forays against our enemies alike are dependent upon ample supplies of high-octane gasoline.

In brief, gasoline and fuel oil provide conveniences, luxuries and security which Americans have grown to regard as inalienable rights and which they never will give up so long as they have arms with which to fight. These "rights" might never have loomed so large in our habits had we not had an abundance of petroleum. But since they have become an inseparable part of America's design for living, Americans will seek to preserve them when our petroleum reserves and imports are inadequate to meet the demands of this mobile and industrial age. The practicable and perhaps the most feasible way to do this is to develop, on a commercial basis, known methods of making liquid fuel from coal, lignite or oil shale.

"When our petroleum reserves and imports are inadequate" describes a

time which may be far less distant than even the better-informed have foreseen. Yet it is a phrase which is certain to provoke incredulity. It will even call for ridicule from the many who are somewhat less than well informed. The public at large has been thoroughly imbued with the idea that America has unlimited oil reserves because we have been exploiting them at a greater rate than the rest of the world. But what is the truth about our oil reserves? And what difference will it make in our lives after the war if we do not again have our customary peacetime flow of oil?

The fact is that discoveries of new oil reserves have been for several years past at a rate scarcely equal to one-third the rate of consumption. However, extensions of older fields, together with such new discoveries as have been made, have been adequate to maintain our proved reserves at 19 to 20 billion barrels. Since we are consuming petroleum at the rate of approximately 1.4 billion barrels a year, our known reserve is 13 or 14 times our present annual rate of consumption. This does not mean that we will exhaust our present known petroleum reserves in 13 or 14 years, for reasons I shall take up more fully later.

No one can deny, of course, that this reserve may be increased in time to come by the discovery of new oil fields, although our geologists long have warned that discovery could not keep pace with established consumption. On the other hand, it is equally probable that our oil resources may be depleted at a rate much more rapid than we anticipate because of the necessities of war and of possible errors in our estimates.

In any event, with petroleum reserves at a low level, it is no part of wisdom for you or me to sit idly by, twiddling our thumbs, while waiting for accidents or miracles to solve the inevitable problems already so uncomfortably close at hand in supplying the nation's liquid fuel and oil requirements. Ordinary common sense demands that we take positive action immediately to prepare ourselves to meet any exigency which may arise as a result of dwindling and possibly eventual disappearance of our oil reserves.

Must Husband Oil Reserves; Produce From Coal or Shale

THE FIRST practical step is to initiate whatever action may be necessary to husband our diminishing petroleum resources. We must reserve the higher fuel values of petroleum for those uses that cannot be met so efficiently, if at all, by the direct combustion of coal. The exercise of this public policy can in no way excuse us for not immediately developing practical methods of producing gasoline, kerosene, diesel fuel, other liquid fuels and lubricants either from coal, oil shale or both.

As a specific move in this direction I am preparing to recommend to the Congress legislation which would authorize the Secretary of the Interior to build and operate a demonstration-type industrial-scale coal-hydrogenation pilot plant or plants. Before I can be boiled alive in some of the oil that we still have left for trying to shove the government into competition with private enterprise on another front, let me offer my reasons for believing that this legislation is not only wise but indispensable to our future security.

It already is known to all industrial chemists that gasoline and other petroleum products may be obtained from coal and lignite by both direct and indirect hydrogenation. Both processes were invented and first put into commercial-scale production in Germany. The annual production rate today from German plants of both types is estimated at 5,000,000 metric tons or more. This is believed to be more than one-third of Hitler's wartime requirements for Luftwaffe, tanks and all. Imperial Chemical Industries is operating a direct hydrogenation plant in England with a capacity of 3,540 bbl. a day. Other commercial plants of unknown capacity are, or were, in operation in France and Japan. The development of processes for coal hydrogenation on a commercial or semi-commercial basis in Germany and Japan reflects the foresight of war-bent countries without appreciable internal petroleum resources. In the United States, where the delusion of inexhaustible oil resources lingers tenaciously, we have been able, so far, to make only a gesture toward solving the liquid-fuel problems that inevitably will be ours if additions to our known reserves keep on diminishing at the present rate, to say nothing of the difficulties we may encounter if that pace becomes accelerated.

As early as 1935, before this world war arrested our startled attention, scientists in the Bureau of Mines were keenly aware that petroleum discoveries were lagging behind consumption. They suggested immediate experimentation with coal hydrogenation. We began to ask Congress for funds for this purpose in 1935. In 1937 the first drop of oil flowed from the apparatus in the Bureau's experimental small-scale direct-hydrogenation plant at Pittsburgh.

This plant has a capacity of 100 lb. of coal per 24 hours. Its main objective has been to study hydrogenation of coals from the more important coal and lignite beds in the United States. Fourteen coals have been assayed. The Bureau has received an appropriation for this fiscal year for laboratory-scale experimentation with indirect hydrogenation. Much less is known here about this process. The Germans have been successful in concealing vital information.

Laboratory research, important as it is, cannot do the great amount of full-scale developmental research which can be accomplished only in a full-scale demonstrative pilot plant. With petroleum reserves dropping toward dangerous levels this research obviously should be undertaken at once to protect the nation from possible disaster in this field such as it suffered with synthetic rubber.

The assurance of a future supply of counterfeit (although of coin current value) petroleum products is a matter of public concern and public safety. So I think that it is wholly in keeping with present public thought that government should undertake this large-scale research. Considerable private research along this line has been conducted by generous privately financed research groups, but unquestionably more rapid progress can be made with government financing and with the cooperation of government chemists and engineers with those of industry.

To begin with we need data for designing commercial plants and on construction costs. Lacking these, we can hardly expect that private capital will readily venture to finance a brand-new untried industry, no matter how large and important it is likely to grow in the future. Part of these data may be obtained, perhaps, by the simple expedient of borrowing engineers from Imperial Chemical Industries, which built and operates the plant in England previously referred to. I shall hazard the guess, however, that

(Continued on p. 60 after graphic material on fuel resources and hydrogenation)

COAL'S NEW HORIZONS

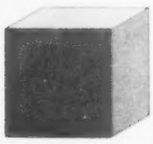
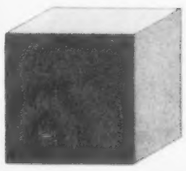
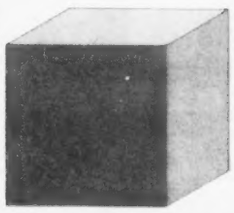
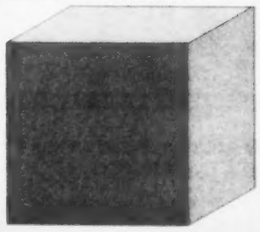
COAL: 98.8% of U. S. Fuel Resources

	RESERVES, B.T.U.	1942 OUTPUT, B.T.U.	RATIO: 1942 OUTPUT TO RESERVES
COAL:	67,106,828,000,000,000,000	17,520,000,000,000,000	1:3,830
Petroleum:	118,000,000,000,000,000	8,400,000,000,000,000	1:14
Oil Shale:	579,000,000,000,000,000	NONE	
Nat. Gas:	104,500,000,000,000,000	3,300,000,000,000,000	1:32

B.T.U. RESERVES based on the following: coal, 3,180,765,220,000 net tons as of Jan. 1, 1937, "Energy Resources and National Policy," 1939 report of the National Resources Committee; oil from shale, 91,944,885,400 bbl. estimated recoverable, D. E. Winchester, "Report II of the Federal Oil Conservation Board to the President of the United States, 1926"; petroleum, 20,082,793,000 bbl. "proved reserves" as of Dec. 31, 1942, Committee on Petroleum Reserves, American Petroleum Institute; natural gas, 97,144,000,000,000 cu.ft., 1943 preliminary estimate of proved reserves of casing-head, wet and dry gases, Petroleum Administration for War.

1942 OUTPUT: anthracite, 59,961,000 tons; bituminous coal, 580,000,000 tons; crude petroleum, 1,385,479,000 bbl.; natural gas, 3,100,000,000,000 cu.ft. (estimated).

HOW U. S. FUEL RESOURCES ARE DISTRIBUTED

	COAL	OIL	OIL SHALE
Northeastern Connecticut, Delaware, Maine Maryland, Massachusetts Michigan, New Hampshire New Jersey, New York Rhode Island, Ohio Pennsylvania, Vermont			
Southeastern Alabama, Florida, Georgia Kentucky, North Carolina South Carolina, Tennessee Virginia, West Virginia			
Central Arkansas, Illinois, Indiana Iowa, Kansas, Louisiana Minnesota, Mississippi Missouri, Nebraska, North Dakota Oklahoma, South Dakota, Texas Wisconsin			
Western Arizona, California Colorado, Idaho, Montana Nevada, New Mexico, Oregon Utah, Washington, Wyoming			

SIZE OF BLOCK INDICATES RELATIVE B.T.U. CONTENT

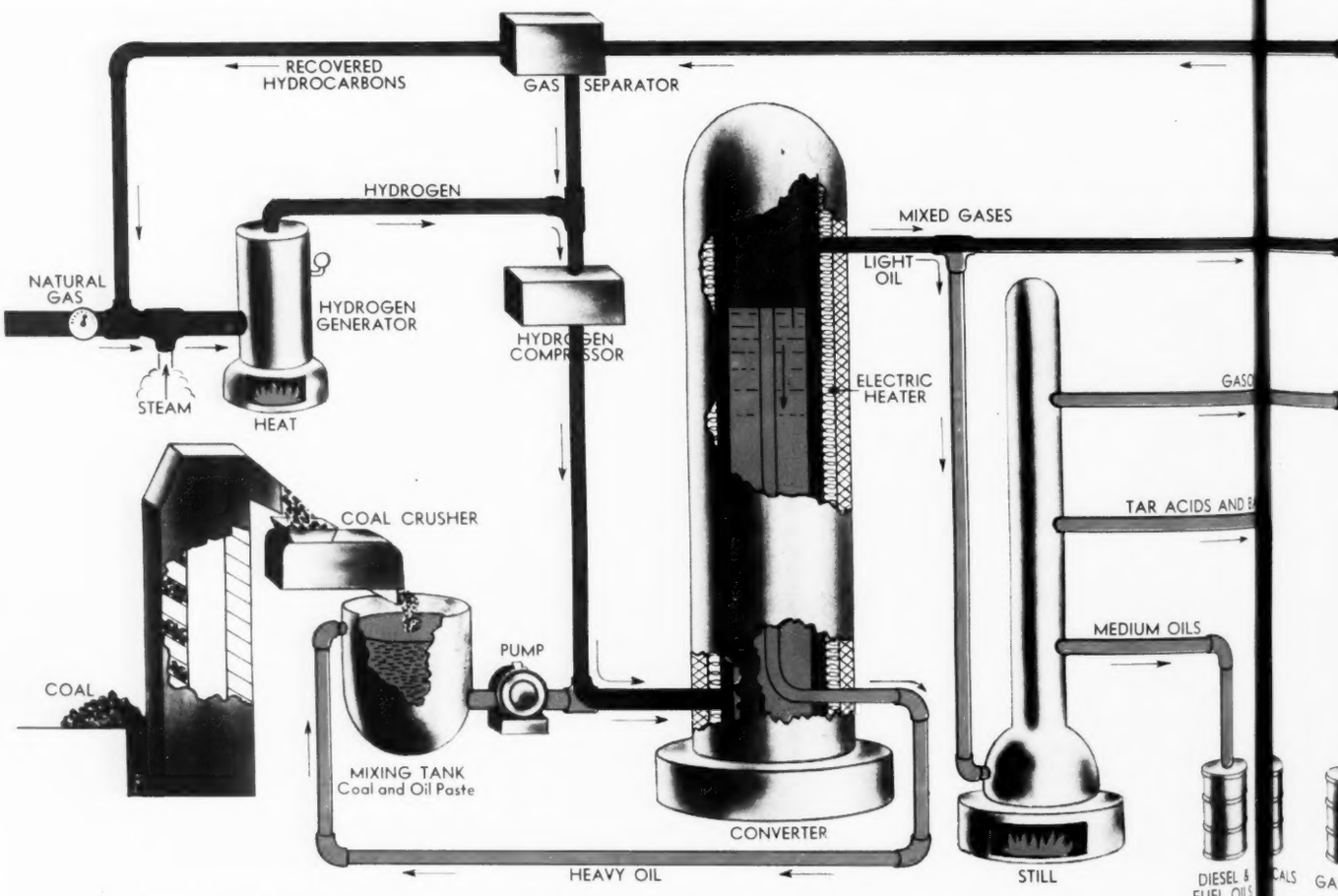
Gasoline and Oil from Coal: What's Being Done

GERMANY: Annual estimated production, 5,000,000 metric tons or more, over one-third "Hitler's war-time requirements for Luftwaffe, tanks and all."

GREAT BRITAIN: Imperial Chemical Industries plant, 3,540-bbl. daily capacity.

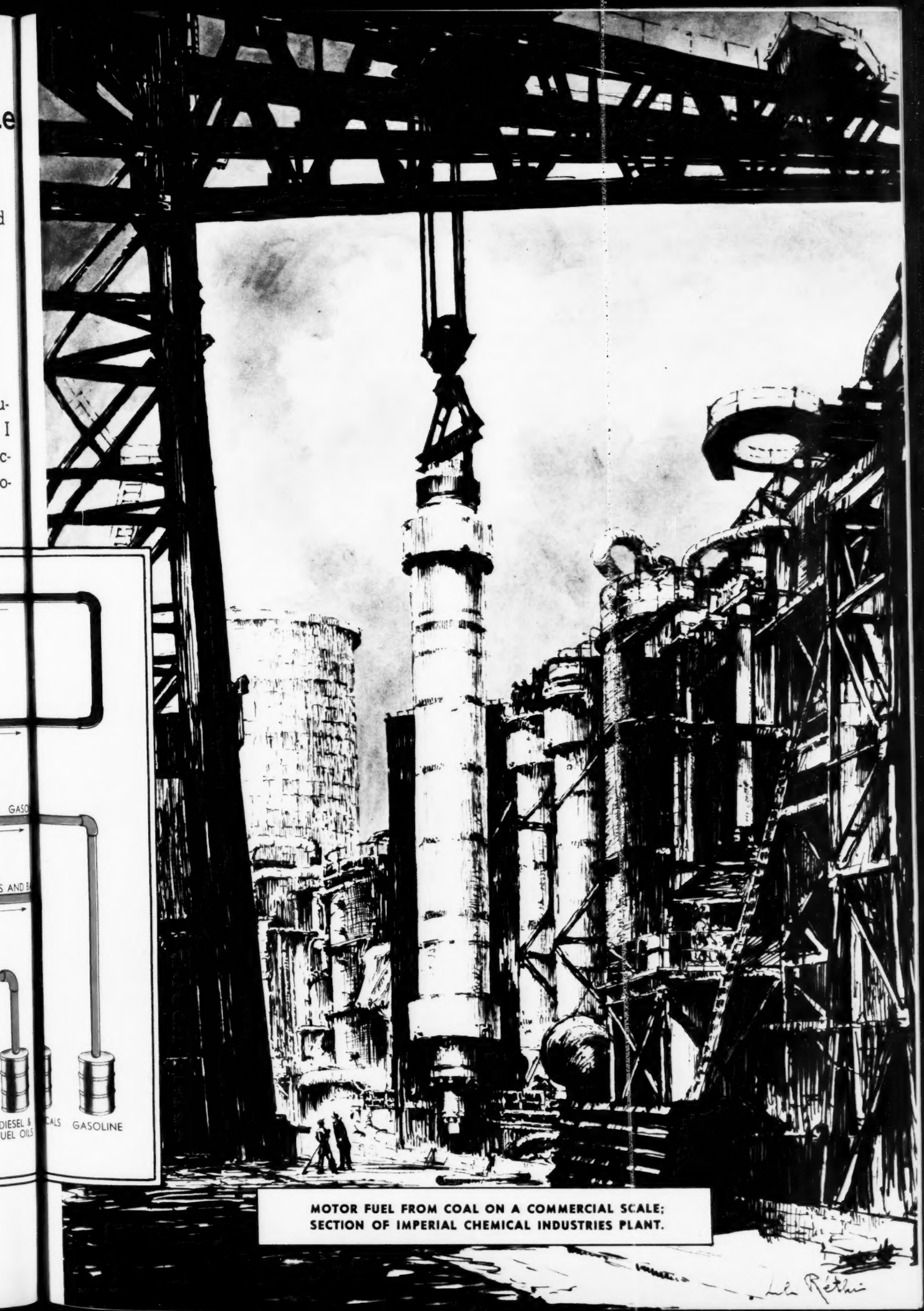
FRANCE and JAPAN: Are or were operating commercial plants.

UNITED STATES: Petroleum trend dictates immediate full-scale investigation. Present Bureau of Mines pilot plant shows the way on yields. "As a specific move in this direction, I am preparing to recommend to the Congress legislation which would authorize the Secretary of the Interior to build and operate a demonstration-type industrial-scale coal-hydrogenation pilot plant or plants." – *Harold L. Ickes.*



Simplified Flow Diagram for Bureau of Mines Coal Hydrogenation Plant

HOW COAL OR LIGNITE IS CONVERTED INTO MOTOR FUEL BY THE DIRECT-HYDROGENATION PROCESS.



MOTOR FUEL FROM COAL ON A COMMERCIAL SCALE;
SECTION OF IMPERIAL CHEMICAL INDUSTRIES PLANT.

most of what we need to know we shall have to learn the hard way. In my opinion, the answers to any number of vital questions can be found only by undergoing the actual experience of building and operating demonstration-type plants.

Answering these questions will consume an unpredictable amount of time. Since we must race against too quickly disappearing oil reserves, we cannot get started too soon. Almost 15 years elapsed from the time a German scientist first discovered the direct process of coal liquefaction until a large commercial plant was put into operation. This indicates that much research work was necessary, especially to solve difficult problems attending the development of equipment for the process.

Driven by the American passion for putting things on a paying basis, we must go even further in our developmental work than did the Germans. Neither their plants nor those in England, France or Japan are, or ever have been, in a strict sense, on a commercial basis. Commercial operation of these plants has been made possible only by large government subsidies in some form or other.

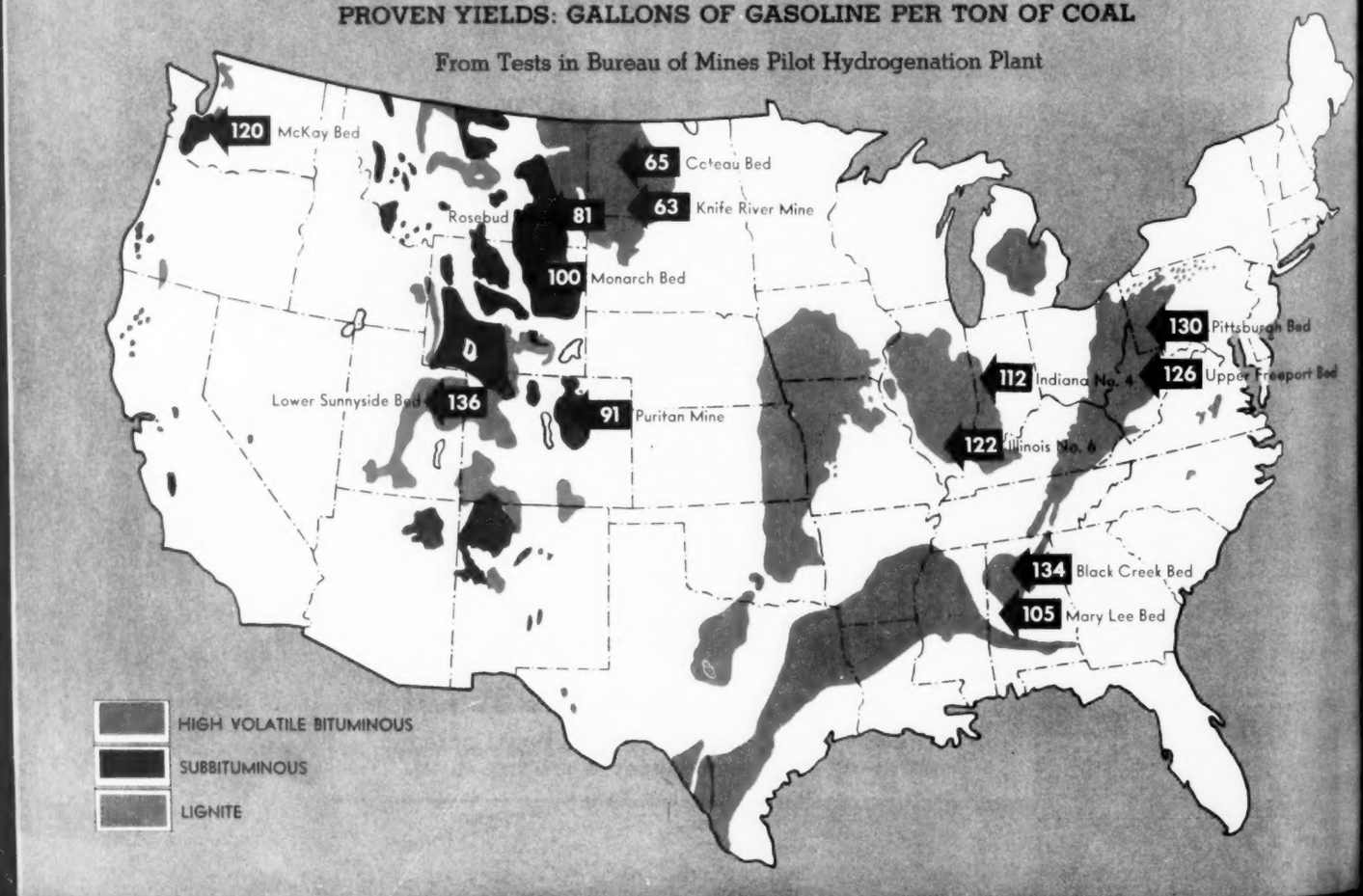
Of equal importance is the need for intensive large-scale research in the chemistry of the processes. At present, the octane rating of gasoline produced by the direct process is 70 to 75. This number can be increased to 85 or 90 by adding tetraethyl lead. The indirect process yields gasoline of such a low octane number that it must be re-formed by cracking before it can be used as a motor fuel, although the diesel fuel recovered by this method is excellent. Before we can depend upon coal as a source of our airplane fuel we must find a way to boost the octane number to 100. German aviators right now are depending on leaded gasoline from direct hydrogenation, which we believe cannot have a higher octane rating than 90 at the most.

Another problem which must be whipped is the cost of producing gasoline. We have plausible estimates ranging from 12 to 25c. a gallon. This is two to four times the cost of gasoline from petroleum. If the cost of production can be held at the lower figure, the retail price of gasoline recovered from coal should not exceed the average price of petroleum gasoline by more than 10c. a gallon at the most. It is possible that the cost could be brought still lower through chemical research. For example, 5 tons of high-volatile bituminous coal, 6.5 tons of subbituminous coal or 9 tons of lignite are used by the direct-hydrogenation process in making 1 ton of gasoline. Only about 40 to 45 percent of the original heat units remain in the resulting motor fuel. Perhaps a method could be developed whereby some of this lost energy might be retained.

It would be necessary to double the present production of coal to meet its normal uses and supply a sufficient quantity to provide the normal production of gasoline in the United States. Future research may result in a higher yield of gasoline per ton of coal and thus cut the coal requirements to some extent.

Although we estimate known petroleum reserves as equal to 13 or 14 years' requirements, nature has no valve that we can set, thereby causing oil wells to flow or yield through the pump a year's requirements in a 12-month period. It is estimated that it will take about 50 years to extract the known existing petroleum from the ground. This means that, lacking new discoveries, we shall suffer from a shortage of petroleum products while we still have large reserves in the ground unless we act at once to supplement them from one or more sources within the space of a very few years. This can be done in one or two ways or a combination of both: importation or hydrogenation.

When it was first proposed that the Bureau of Mines begin experimentation with coal liquefaction for the recovery of gasoline, some leaders in industries interested in the continuation of an ample supply of in-



expensive liquid fuel gave the idea a good-natured brush off. Said they, the government shouldn't spend a plugged nickel in this form of research. Why should it? Aren't our petroleum resources practically inexhaustible? Perhaps these and many others have changed their minds and now will favor this form of research after all.

If our research is to be of any value it must be carried on in a full-scale demonstration-type commercial pilot plant. It must be carried on, in its initial stages, at a loss. We cannot estimate precisely the amount of money that will be necessary for this purpose. It is obvious, though, that it is better to subsidize the initial work, which doubtless will lead to placing coal hydrogenation on a paying basis than to subsidize the industry for many years to come as has been necessary in Germany, Japan and England.

This discussion of coal as the possible future source of our gasoline must not be construed as indicating that I have lost sight of the possibilities of oil shale. I have them very much in mind, but it would be unwise for numerous cogent reasons to put all our eggs in one basket.

The Bureau of Mines has carried on extensive experiments in the recovery of oil from shale. On the basis of available data this process would appear to be somewhat cheaper than obtaining gasoline and other petroleum products from coal.

No worth-while comparison of relative production costs can be made, however, until both have been given a full-scale trial over a period of time long enough to develop them fully. For this reason I am convinced that experimental work with coal and shale should proceed simultaneously. It may prove to be cheaper to derive our liquid fuels from shale, but, in addition to the actual cost of production, there are numerous other factors to consider. Among them is the fact that virtually all of our known oil-shale deposits are in Utah and Colorado, although shale oil can be extracted, not too economically, from some of the black shales east of the Mississippi. The freight charges from Colorado to centers of population and industry in the East might tip the scales in favor of coal mined and processed in the East or in other sections where coal is available near a large market for gasoline.

Considering the limitations of transportation, it would be worse than foolish to depend upon a single locality for the source of our gasoline and oil in some future crisis comparable to the present one. The location of our most prolific oil fields in the midcontinent and far-western areas has been the cause of transportation problems which led to our shortages in the East.

On the other hand, coal and lignite are found in more than 30 of our 48 states. By locating properly our future coal-hydrogenation plants we can solve the transportation problem by producing liquid fuels within easy distances of the places of their consumption.

It was the distance of oil reserves from centers of industries—in some instances 5,000 miles—which led the Soviet Union to experiment with hydrogenation of much more accessible coals. It must be remembered, too, that our deposits of oil shale are sufficient to yield our liquid fuel requirements for only 50 or 75 years at the present rate of consumption.

In any event, the oil extracted from shale is of a low quality and plants for its hydrogenation, if gasoline is wanted, will have to be built just as in the case of coal.

Coal Hydrogenation Outlook Includes Rubber and Plastics

ONE RESULT of the country's present synthetic-rubber program is bound to be a new market for coal. At present the government contemplates the manufacture annually of 700,000 tons of Buna-S rubber. The major raw materials for this rubber are one-fourth styrene and three-fourths butadiene. Styrene is derived from coal. At the inception of the proposed program its butadiene requirements will be derived chiefly from petroleum and alcohol. However, butadiene can, and doubtless later will, be made from coal as petroleum supplies grow smaller.

Agriculture is expected to benefit to the tune of $81,900,000 annually and the petroleum industry at the rate of $22,300,000 from the rubber program. The amount going to coal will be less than $10,000,000. A considerable portion of the larger sums might have found their way into the hands of bituminous coal producers if they previously had carried on sufficient research to establish a technologic and engineering basis on which plant construction could have proceeded rapidly.

Contrary to what seems to be a popular conception, synthetic-rubber manufacture, when it eventually is established, is reasonably sure to remain as one of our large postwar industries. It is true that the estimated cost of making synthetic rubber is higher than the price we used to pay for natural rubber from the Dutch East Indies. However, some years are bound to elapse between the time the islands in question are recaptured and the resumption of rubber production on a large scale. Many economists and other experts believe that the Dutch never again will be able to keep the cost of labor at the low figure of prewar days. Thus the cost of their product is obliged to be higher whenever it appears on the market again. The price of South American rubber has for some time approached the cost of synthetic-rubber manufacture.

Aside from the question of cost, it is inconceivable that the United States again would expose itself to the mercies of a foreign source of rubber which might be cut off overnight.

However, before coal can assume the role in synthetic-rubber manufacture that would be justified, research and development must be greatly expanded. Despite the present limited participation of styrene, the demand for it is going to place a strain on the benzol supply needed elsewhere in many vital industries. A method must be developed for producing styrene independently of benzol. Likewise there must be extensive research on the subject of butadiene. The Bureau of Mines is investigating butadiene from the point of view of both direct and indirect coal hydrogenation processes on a laboratory scale. These studies will be speeded and given greater significance when carried on in a full-scale commercial plant.

Another industry dependent to a large degree on coal is destined, when hydrogenation of coal is more fully developed, to reach a new stature and diversification. I refer to plastics. Growth already is under way due to the compulsions of war. Shortages of metals, which in some instances will be permanent, have led to plastic substitutes. In some uses these have proved superior to the original article. The growth of that section of the industry which uses raw materials derived from coal now faces a sharp limitation. Its expansion depends on the quantity of organic materials made available as byproducts in the manufacture of coke from coal. The quantity of these materials, in

turn, is limited by the demand for coke. Hydrogenation of coal on a commercial scale will overcome this limitation. Hydrogenation will increase the yield of tar acids—phenol, cresoles, xylenols—used in making plastics by about ten times those obtained in coke manufacture.

Possibly claims that are too extravagant have been made for the future of plastics. Nevertheless, they already are replacing more critical materials where the requirements are lightness; transparency; insulation of heat, sound and electricity; and ease of fabrication, and where the strength or hardness of steel is not essential. Many articles, such as airplane windows, automobile safety glass, dentures, unbreakable spectacles and a host of others, now are made of plastics derived from resins which may be synthesized from coal.

The possibilities of plastics from coal range from a bottle cap to the crystal clear nose of a bomber with 4,000 sq.in. of surface. In fact, milady's chic appearance from head to toe, literally speaking, is the gift of coal to beauty. Hairdressers are fixing permanent waves with a plastic material that can be made from coal, and nylon hose are an ingenious derivative of coal, air and water.

Along with raw materials for plastics, coal hydrogenation will make available the tar bases which serve as raw materials in several organic-chemical processes. Hydrogenation, likewise, will increase the production of benzol and toluene for the manufacture of explosives. The quantity of coal that goes into the ultimate output of plastics, chemicals, solvents and dyes may continue to be a small percentage of the total mined. The cost of synthetic rubber or gasoline produced from coal may be greater than the cost of natural rubber or gasoline refined from petroleum in the absence of further experimental work in hydrogenation. But in weighing the value of coal hydrogenation we must take into account the economic advantages which may result from producing in a single plant such a range of products as gasoline, oil, raw material for rubber, plastics, explosives, pharmaceutical chemicals, dyes and organic chemicals.

Colloidal Fuel, "Fluid Coal," Coking, Marked for Increase

WHILE GAZING on coal horizons which, measured in time, may be one or ten years distant, coal producers should not neglect to observe the events of the moment. They must not fail to take cognizance of what obviously will occur as soon as hostilities cease. They should study changes, accomplished or inevitable, with respect to the probable impact upon their business.

One immediate consequence of the war is of vast importance to the whole bituminous coal and related industries. This is the enforced conversion from fuel oil to coal, especially by large industrial consumers. There can be very little doubt that this conversion will be, for the most part, permanent. Thereby, the coal industry will regain much of the business it has lost to competing fuels since the days when it furnished 90 percent of the nation's fuel and energy and the other 10 percent came chiefly from water power and wood.

There are two compelling reasons for this belief. First is the rapid decline of petroleum resources. Lacking vast newly discovered oil resources here or great importations of cheap foreign oil, it is not to be presumed that smart business men forced to convert to coal because of a lack of oil will court the possibility of repeating this sad experience within a few years. No matter from what source we derive our oil and liquid fuels, there always will remain a heavy residual oil which can be burned economically under boilers. But will there be enough to go around? One bit of concrete evidence that big industrialists intend to be prepared for all fuel emergencies is the increase in installations of dual fuel plants. These are constructed so that they may consume either coal or oil, whichever may be cheaper or more readily available.

The second reason for believing that conversion to coal will be more or less permanent, regardless of the possibility of new petroleum discoveries, is the huge cost of conversions. In the larger plants it must be calculated in tens of thousands and sometimes in hundreds of thousands of dollars. I do not have a price list handy but I recall that several years ago a large utility company installed four new underfeed stokers at a cost in excess of $600,000. When you spend money like that you usually keep what you get as long as it is serviceable.

Because their power plants were engineered exclusively for the use of fuel oil, some large industries are finding it impossible to convert to coal, short of tearing down their works and building them over again. These have turned to an investigation of colloidal fuel. This is a mixture of oil and coal suitable for use in oil-burning industrial furnaces.

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In weighing the value of coal hydrogenation we must take into account the economic advantages which may result from producing in a single plant such a range of products as gasoline, oil, raw material for rubber, plastics, explosives, pharmaceutical chemicals, dyes and organic chemicals.

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Colloidal fuel was the subject of an intensive study as long ago as 1917 and 1918. Its use appears to solve some of the consumer's problems although it adds several. In installations where the mixture can be used without seriously reducing the boiler rating it can be the means of saving as much as 30 percent in oil. This would result in the conservation of scarce fuel but it would not lower the cost of operation.

The costs of pulverizing coal fine enough, treating the mixture to render it stable or installing mechanical contrivances to keep it mixed raises the price to a figure comparable to oil. However, colloidal fuel may be a godsend to plants with furnaces having a limited combustion space and passage for gases, and no provision for ash disposal. These conditions would make the use of solid fuel difficult, if not impossible, without rebuilding the furnaces.

To these industrial markets recaptured gratuitously by the coal industry because of circumstances, research has added and is adding others. Research long ago demonstrated the possibility of using so-called "fluid coal." This is coal finely pulverized at a central plant and blown to various furnaces by air pressure. It can be circulated about plants in pipes which can be tapped wherever the fuel is needed, just as oil pipes can be tapped.

The use of so-called "fluid coal" in the past has been confined largely to big utilities. Its wider adoption by industry probably has been retarded by several circumstances. First, oil

was cheap and seemingly plentiful. Second, it is necessary to guard against explosions when using finely pulverized coal. Third, complex machinery and trained crews are needed to handle it. Industrial consumers, unquestionably, will turn in greatly increased numbers to this form of fuel whenever needed machinery for its preparation and use is available.

The feasibility of using powdered coal in metallurgical processes has been demonstrated fully. It is being used instead of oil or gas in many heat-treating and billet-heating furnaces. Another war-induced development of the moment, the repercussions of which will be felt in the immediate future, is the program fostered by the Coordinator of Solid Fuels for War and the Bureau of Mines, looking toward a higher grade of more uniform coke.

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Coal and lignite are found in more than 30 of our 48 states. By locating properly our future hydrogenation plants we can solve the transportation problem by producing liquid fuels within easy distances of the places of their consumption.

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It has been estimated that 100 percent participation in this program by all byproduct coke ovens would result in an average increase of about 50 tons of pig iron a day per blast furnace in operation in this country. One phase of this program which will be of service to the coal industry is the careful study being made to determine the location and properties of coking coals in the United States. The fear that industries depending on coke may migrate soon because of the exhaustion of good coking coals in the East appears groundless, at least for the present.

It is true that many of our long-worked deposits of high-grade coking coal are beginning to run short. However, there are still unopened many deposits of good coking coal in eastern Kentucky, West Virginia, and even in parts of Pennsylvania. And we still indulge in the wasteful practice of sending good coking coal to steam plants.

In the pursuit of our better-coke program we are encouraging the installation of washing apparatus at mines to reduce the sulphur and ash content of the coal, as well as to keep sulphur and ash uniform. Installed as a war measure, the washers unquestionably will continue to operate in the ensuing period of peace.

This program likewise includes selective methods of mining so that high sulphur and ash coal will be loaded and brought out separately from the coal better suited for coking. Technicians are encouraging storing and mixing methods which lead to more uniform coke. They are advocating revised means of loading coke ovens to obtain uniform bulk density. They are suggesting ways of charging ovens to get uniform sizes of product and provide maximum wind passage to obtain higher production. At the end of the war these improved practices should have become part of a superior technique in common use throughout the coke industry. As the war-created demand for steel lessens, it is almost certain that most of the beehive ovens will again close down. However, there is a strong possibility that byproduct ovens can be operated close to their present rate of production as the result of the improved methods of operation.

I foresee this possibility because of two present trends. The increasing use of plastics, the growth of synthetic-rubber manufacture and similar developments are likely to create a demand for all of the byproducts which can be made available from coal carbonization until that process, on a commercial basis, results in the production of far more and cheaper tar acids and other byproducts. It is wholly within the realm of probability that the production of byproducts will, for a time, assume primary importance, while the production of coke takes a secondary role.

A second reason for believing that the demand for coke may remain firm after the war stems from the conversion from oil to coal, both by large industrial users and by domestic consumers. Wholesale conversion is bound to be followed by smoke ordinances such as that pioneered by St. Louis, which the city has been able to maintain despite attacks based on wartime expediency. Even where smoke ordinances are lacking, it is sound business for soft-coal producers to encourage the elimination of smoke. Atmospheric pollution, dirt and grime associated with bituminous-coal combustion originally led many consumers to abandon its use and turn to a cleaner fuel.

There are two avenues of approach to the problem of smoke elimination. One is to burn a fuel which is actually smokeless. Coke made by the improved methods being adopted as wartime measures certainly is such a fuel. When the need for war goods is ended, releasing supplies of coke, it is wholly possible that the demand will remain at a high level to meet the requirements of both domestic and industrial consumers for smokeless fuel. The second method by which the same end can be achieved is to burn bituminous coal in apparatus properly designed and engineered for smokeless combustion. Improved equipment for smokeless combustion, new types of automatic stokers and even hand-feed stoves designed to burn bituminous coal smokelessly have been developed recently. Priorities have kept them off of the market. They will sweep onto the market just as soon as materials for their manufacture are released. Consumers will be delighted to learn that they can heat or generate power as cleanly and as conveniently as was possible with oil fuel.

Coal Prepared for the Future By Stabilization Measures

I HAVE DWELT at some length upon the more distant horizons of the coal industry, but one might well ask: "What about the prospects for the more immediate future—that period of readjustment and reconstruction that will follow the termination of the fighting?" Well do many of those still in the industry who lived through the period following the first World War remember what happened then. In that period, there was a brief artificial prosperity for the coal industry due to shortages of coal brought about by shortages of railroad equipment and disturbances in the mining and transportation industries. Prices of coal skyrocketed to as high as $20 per ton in some instances. The price-peak period, from 1920 to 1922, was followed by a sharp increase in mine-production capacity. Investors, attracted by the high prices for coal, expanded mining capacity as manpower and materials became available.

During the time when industries were being converted from war manufacture to peace-time operations, the consumption of fuel decreased. But,

when the re-converted industries again began to turn out civilian goods, the consumption of fuel increased. Bituminous coal did not participate in that rising fuel market. Competitive fuels increased, while the consumption of coal decreased, relatively, partly because of the competition of other fuels and partly because of increased efficiency in the use of coal.

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It is my opinion that coal requirements will remain at high levels during the many years of peace once we have reconstructed our economy on a peace-time basis.

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This situation ushered in an era of destructive competition in which producers fought for survival, with price-cutting and other undesirable practices as their principal weapons. These conditions brought near-ruin to the industry, resulted in great losses of investments, bred differences between labor and management and created one of the nation's most difficult economic problems. For 15 years prior to 1940, the industry suffered a net loss every year, ranging from about $7,500,000 to about $51,000,000 per annum. Permanent relief was not found until the establishment of minimum prices and marketing rules and regulations by the Bituminous Coal Division of the Department of the Interior under the Bituminous Coal Act on Oct. 1, 1940.

In view of this precedent, what can we reasonably expect to befall the industry at the conclusion of this war? Will it again be confronted by the evils of excess capacity and be torn by a savage competitive war for sales?

We may expect at least a brief slump in fuel requirements during the readjustment period that will follow this war. But I think I can frankly state that the industry has in the Bituminous Coal Act a very effective barrier against recurrence, in the post-war readjustment period, of the demoralization that followed World War I. However large or small this slump may be and however long it may continue, the industry should fare far better than it did the last time.

The need for market stabilization, even in times of rising coal requirements, has been demonstrated. Seasonal effects upon the coal market, lack of balance between the sale of the different sizes of coals and other characteristics peculiar to the coal industry create problems even during times of increased coal requirements. These problems have a ready solution in the stabilizing effect of the minimum prices and marketing rules and regulations established under the Coal Act.

Every major coal-producing nation in the world has been faced with these problems. In each one, government action has been necessary. Other countries have subsidized the operators, nationalized the industry or regimented it into a creature of the state.

The horizon of the coal industry in the United States is brightened by the fact that we have found a way to deal with its problems in a democratic American way. We shall not have to follow the course of these other nations. By relieving the markets of burdensome practices and through cooperative effort by the industry and the government, the Coal Act affords a means of enabling producers to compete in a fair and orderly manner.

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It is quite unlikely that enough mine machinery can be manufactured during the war to supply the requirements of the industry. Consequently, when the war is over, we may anticipate machinery installations running into millions of dollars.

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The coal industry should be able to come through the readjustment period after this war in a sound condition, ready to take up its responsibilities for providing the fuel to regain our prosperity and improve the American standard of living.

This unquestionably will be a longer war as it is a greatly vaster one than the last. Its requirements in materials dwarf almost to insignificance the output of 1917 and 1918. To meet them, the production of civilian goods has been scaled down to a point never approached in World War I and the end is not yet here.

When we finally nail Hitler's hide on the coal-shed door to dry, we shall need tons upon tons of everything. There will be a tremendous market for the many things that we shall require—automobiles, structural steel, typewriters, electric refrigerators, homes, buses, mine machinery and a hundred thousand other products. It is quite unlikely that enough mine machinery can be manufactured during the war to supply the requirements of the industry. Consequently, when the war is over we may anticipate machinery installations running into millions of dollars.

An immense quantity of fuel and energy will be required to produce these needed civilian goods. You can safely bet your No. 2 Ration Book that coal this time will furnish its fair share of that fuel and energy. Petroleum cannot be expected to push it into a back seat as it did before.

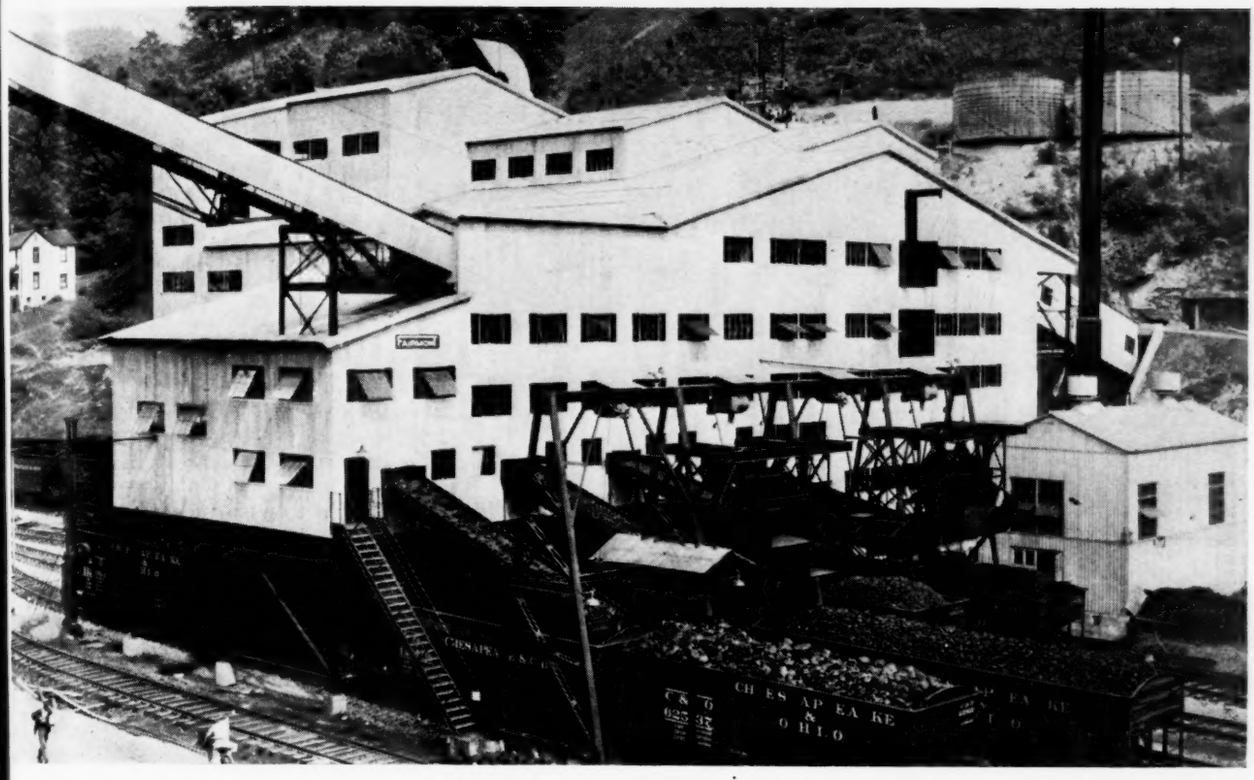
It is my opinion that our coal requirements will remain at high levels during many years of peace once we have reconstructed our economy on a peace-time basis. Later on, the need for coal to make more and more liquid fuels to supplement growing petroleum deficiencies will lend strength to the market.

What is the capacity of our bituminous coal reserves to bear this new load? Our reserves are estimated at 3.2 trillion tons, half of which is low grade.

The vastness of our coal reserves is no excuse for waste. In normal times approximately 35 percent of the soft coal is wasted in mining. This is due to the fact that it has never paid to attempt to recover all of the coal within a vein. During the war, coal is being mined at a rate far higher than normal. It is a natural assumption that waste has been increased with haste. Consequently the war should be followed immediately by a major drive to cut down waste. In this drive producer and labor associations and organizations and government agencies should cooperate. It should be accompanied by intensive research, investigation and education. Special studies should be made of mechanical mining, having as their objective the development of techniques or new equipment to obtain maximum recovery.

Such a campaign necessarily will add to the pent-up demand for more and better cleaning plants which will be released after the war.

To me, the future of the coal industry looks brighter than its past. It can be made still better by continued research in many fields. Until this research has been accomplished it remains true, as H. H. Lowry, director of the Coal Research Laboratory, Carnegie Institute of Technology, once declared: "The producer of coal does not know the value of the product he sells nor the consumer the worth of the material he buys."



New central preparation plant of the Consolidation Coal Co., Jenkins, Ky.

PREPARATION PLUS

Features Consolidation's Jenkins Plant

Duplicate Tracks, Dumps and Feeders Blend Raw Coal—Wet and Dry Cleaners Used — Finished Product Blended Automatically — Dust Elimination, Sludge Disposal, Electrical Controls Advanced in Type

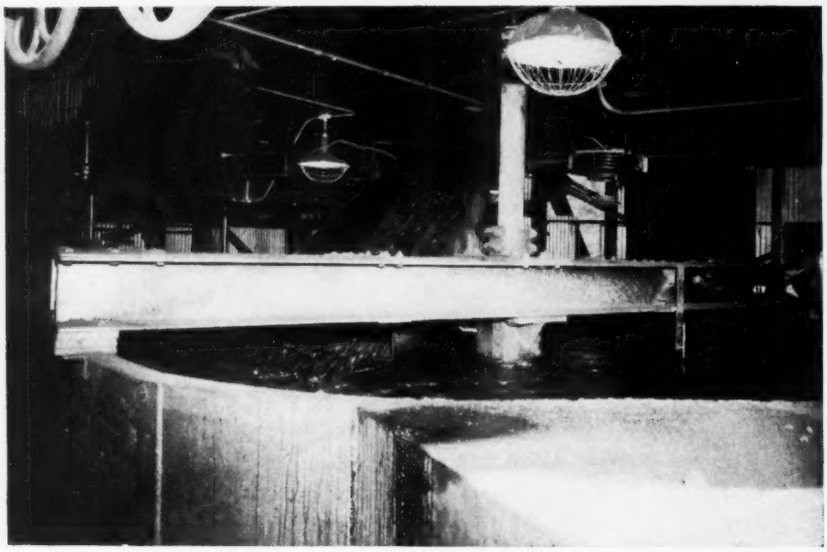
By J. H. EDWARDS
Associate Editor, Coal Age

DESIGNERS went the limit to insure uniformity of quality, low operating cost and reliability in the new 600-tons-per-hour central cleaning plant of the Consolidation Coal Co., Jenkins, Ky. Duplicate car handling and dumping equipment on the mine bottom controls the blending of coal from various sections of the mine and automatic, quickly adjustable equipment insures exactness in the final blending of washed and air-cleaned sizes to make stoker and nut-slack grades. Dust from underground dumping and from the controlled variable feeders to the mine-run belt is removed by a mine fan which performs double duty. Plant sludge is pumped into an abandoned section of the mine.

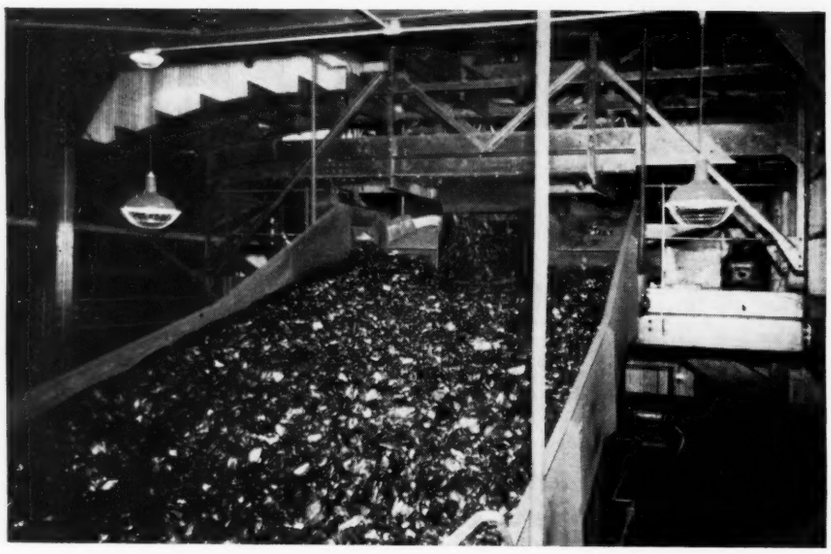
Considering the large number of size combinations the plant will make, the screening and cleaning involved, dust handling, provisions for crushing and for bypassing in case of equipment failures, the plant is characterized by a high degree of simplicity and compactness of design without cramping.

Sequence controls for the electric drives include provisions for every conceivable operating and maintenance situation. Plant operators have been furnished booklets of eleven flowsheets showing valve, gate and screen arrangements for 27 likely combinations of sizes. Maintenance men work by a 30-page schedule covering ten maintenance periods, daily to yearly. Operators on shift communicate by two-way telephone stations which can be heard above the normal plant noises.

This plant, designed and built by the Fairmont Machinery Co. and started up last August to handle the output of Mines 204, 206 and 207, displaced two tipples and has been shipping in excess of 7,500 tons per day, two-shift operation. Therefore it had a part in boosting Consolidation Coal Co.'s total output from about 9½ million net tons in 1941 to approximately 10½ million in 1942, those round numbers not including coal produced by lessors. This Jenkins operation, in Letcher County on the Big Sandy-Elkhorn Branch of the Chesapeake &, Ohio Ry., is one of



Chance cone washing 1¼x⅜.



Lump, washed egg and nut feeding onto the sizing section, main shakers.

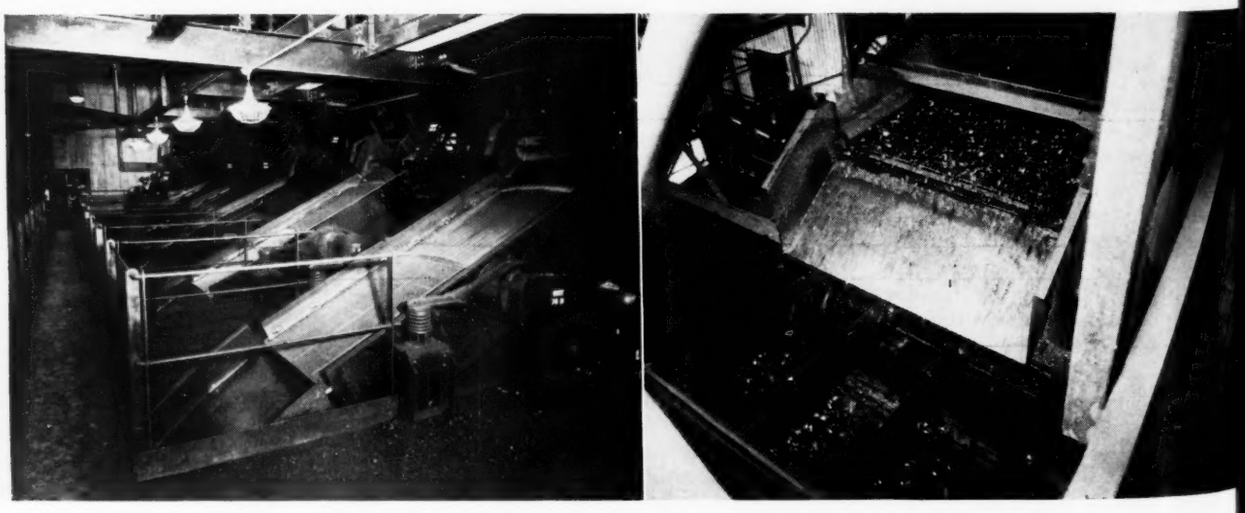
three operated by the company in eastern Kentucky.

The mine-run belt conveyor is a Goodrich 54-in. unit with six plies of 42.-oz. duck. Its lower end extends into the feeder pit on a 14-deg. angle and the length of this section is 115 ft. Out by this same section the belt follows the coal seam, on an angle of about 1½ deg., for about 422 ft. It leaves the seam at the portal on a 750-ft.-radius vertical curve, the distance from PI to head pulley being 221 ft., ending in a straight section 12 ft. long on an angle of 18 deg. The vertical distance between head and tail pulleys is 82 ft.; length of belt, head to tail pulleys, is 758 ft.

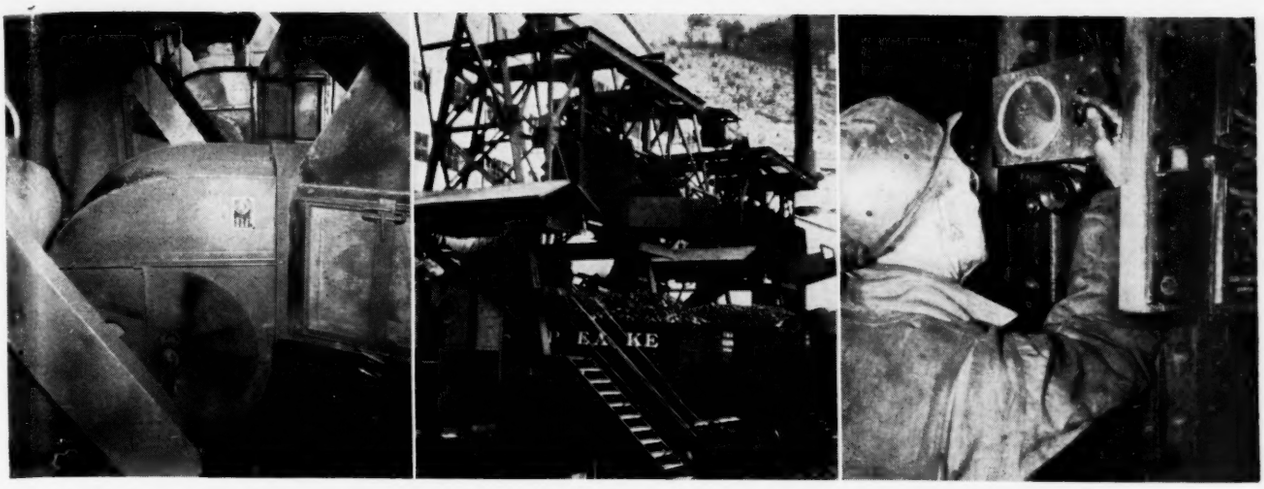
Chance sand-flotation cones are installed to wash the 5x⅜-in. fraction in two sizes and four American tables dry clean the ⅜-in.x50-mesh, also in two sizes. Pangborn cyclone and bag collectors trap the 50-mesh x 0 dust from tables and vibrating screens. An automatic boiler plant for heating the main building, office and dustless treating tanks and pipelines uses 50-mesh x 0 as fuel.

From its lower end in the cleaning plant the refuse belt extends up the hillside on a 17-deg. 21-min. angle a distance of 720 ft., where it flattens off to a slope of 10 deg. 54 min. for a distance of 210 ft. Total length between head and tail pulleys is 930 ft. and the vertical distance is 265 ft.

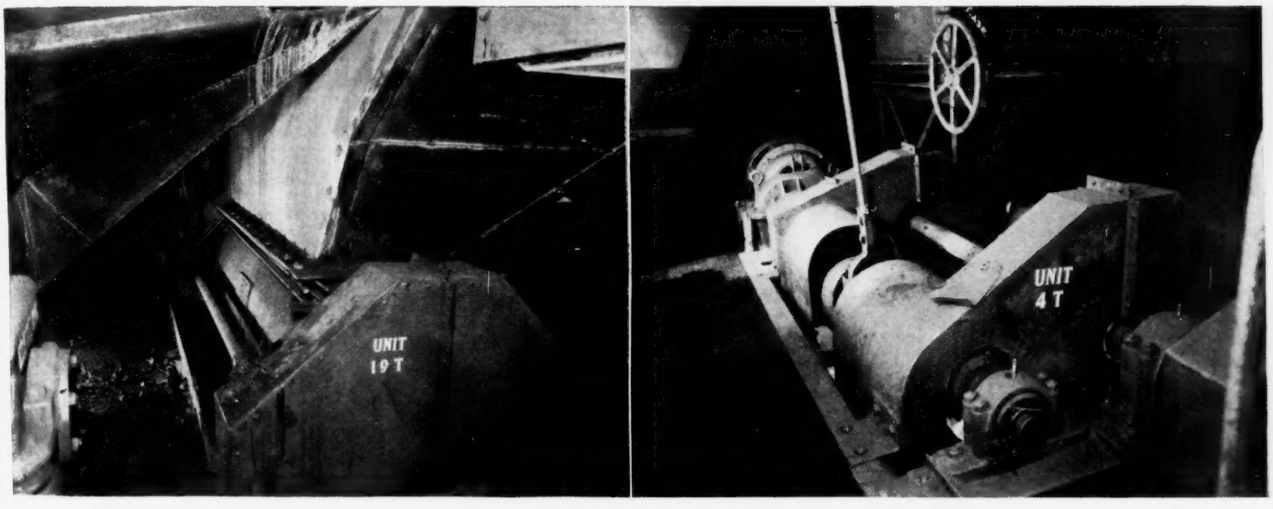
Four of the loading tracks are equipped with loading booms and the slack track has three loading points, two of which can be used at the same time, thus, for the whole plant, providing simultaneous loading of six grades; for instance, the following nominal sizes: 5-in. lump, 5x2-in. egg, 2x1-in. nut, 1x⅜-in. stoker, ⅜x⅛-in. stoker and ⅛-in. x 0 slack.



Left, three-way separation of the raw 1¼x0 is made on these vibrators fed by rotary feeders. One 5-hp. motor operates all five feeders. Right is a primary stoker dewatering screen.



Left, blowers supplying air to the four dry-cleaning tables. Center, view at the ends of the loading booms. In addition to under-boom car-changing chutes, the egg and stoker booms have overhead chutes for use at the high capacities required for certain loadings. Right, one of the microphone and loud-speaker installations used for communication.



Left, one of the crushers used in the plant (21x72 secondary unit). Right, two-speed stoker-boom drive to permit loading at a higher rate if the larger sizes are being crushed.

The particular features of washing, cleaning, sizing and blending incorporated in the plant were adopted to secure the maximum benefits to be derived from mechanical mining of the areas available to the plant and also maintain the high standard of preparation for which "Cavalier" coal is known throughout the industry. Markets for the coal, which is high volatile and has a blocky structure, are metallurgical, byproduct, gas, steam and domestic. For customers requesting "Cavalier" trademarking of domestic shipments, labels are pasted on lumps and scattertags placed in the smaller sizes. The seam contains a continuous middle parting ranging widely in thickness and in character from a shaly fireclay to rock. At present 50 percent of the coal is mechanically loaded and a gradual increase to 100 percent is planned.

Although the plant is rated at 700 tons per hour of input and the total reject is approximately 7 percent (1 percent from the picking tables and 6 percent from mechanical cleaning), the actual output at times is 750 tons per hour. This high output is accomplished by withdrawing coal from two 100-ton storage bins, one for ⅛-in. x 50-mesh and the other for 50-mesh x 0, to make slack and nut-slack blends. Both the egg and stoker booms have two-speed drives, the higher speed of the egg boom to permit the loading of cleaned mine-run at 700 tons per hour and of the stoker boom to permit loading at the same rate when crushing 2-in. lump to minus 2-in. for loading 2-in. nut-slack.

The egg and stoker booms are equipped with overhead-type two-way changeover chutes for changing cars without stopping. These chutes are brought into play simply by hoisting the boom end until it discharges into the chute. Egg, nut and stoker booms also are equipped with Fairmont air-operated sliding chutes beneath the discharge ends to provide for car changing when loading prepared sizes. The lump boom is without either type of car-changing facility, but its control includes a pushbutton for starting and stopping the boom when cars are changed. A time delay in the push-button prevents interrupting the tipple sequence when this pushbutton is operated.

The Chance cones, furnished by United Engineers & Constructors, Inc., are 13 ft. 6 in. in diameter, one cleaning 5x1¼-in. and the other 1¼x⅜-in. coal. Four American "Twin-Dex" air tables handle dry cleaning on the ⅜-in. x 50-mesh coal. Two tables clean ⅜x⅛-in. coal and the other two handle the ⅛-in. x 50-mesh. Each table is provided with an underneath blower, and exhausting is handled by the two fans

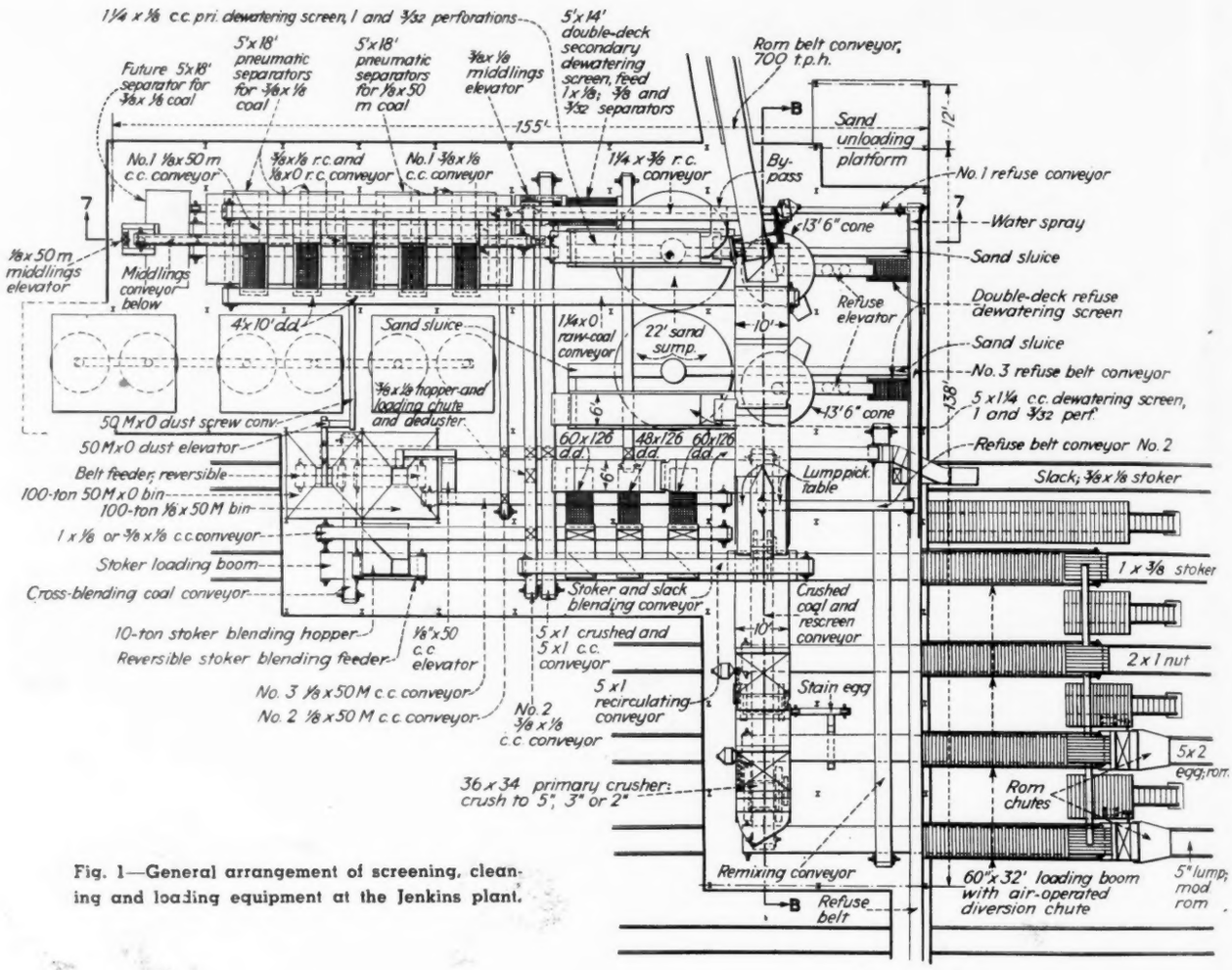

1¼ x ⅛ c.c. pri. dewatering screen, 1 and 3/32 perforations
5'x14' double-deck secondary dewatering screen, feed 1x⅛; ⅜ and 3/32 separators
Rom belt conveyor, 700 t.p.h.
5'x18' pneumatic separators for ⅜x⅛ coal
5'x18' pneumatic separators for ⅛x50 m coal
⅜x⅛ middlings elevator
Future 5'x18' separator for ⅜x⅛ coal
155'
Sand unloading platform
12'
No.1 ⅛x50 m c.c. conveyor
⅜x⅛ r.c. and ⅛x0 r.c. conveyor
No.1 ⅜x⅛ c.c. conveyor
1¼ x ⅜ r.c. conveyor
By-pass
No. 1 refuse conveyor
13'6" cone
Water spray
Sand sluice
⅛x50 m middlings elevator
Middlings conveyor below
4'x10' d.d.
Sand sluice
1¼x0 raw-coal conveyor
22' sand sump
10'
Refuse elevator
Double-deck refuse dewatering screen
Sand sluice
No. 3 refuse belt conveyor
138'
5 x1¼ c.c. dewatering screen, 1 and 3/32 perf.
⅜x⅛ hopper and loading chute and deduster
13'6" cone
50 M x 0 dust screw conv.
60x126 d.d.
48x126 d.d.
60x126 d.d.
Refuse belt conveyor No. 2
50 M x 0 dust elevator
Belt feeder, reversible
Lump pick table
Slack; ⅜x⅛ stoker
100-ton 50 M x 0 bin
100-ton ⅛ x 50 M bin
1 x ⅛ or ⅜ x ⅛ c.c. conveyor
1 x ⅜ stoker
Stoker loading boom
Cross-blending coal conveyor
Stoker and slack blending conveyor
Crushed coal and rescreen conveyor
10-ton stoker blending hopper
⅛"x50 c.c. elevator
5 x1 crushed and 5 x1 c.c. conveyor
Reversible stoker blending feeder
2 x 1 nut
No. 3 ⅛ x 50 M c.c. conveyor
5 x1 recirculating conveyor
Stain egg
No. 2 ⅛ x ⅛ c.c. conveyor
No. 2 ⅛ x 50 M c.c. conveyor
5x2 egg; rom
36 x 34 primary crusher; crush to 5", 3" or 2"
Rom chutes
Remixing conveyor
60"x32' loading boom with air-operated diversion chute
5" lump; mod rom
Refuse belt

Fig. 1—General arrangement of screening, cleaning and loading equipment at the Jenkins plant.

of the dust-collecting system. All fans are Sturtevant. The dust-collecting fans also aspirate the ⅛-in. x 0 coal ahead of the ⅛-in. x 50-mesh dry-cleaning tables, removing the 50-mesh x 0. The dust picked up in the aspirators and over the dry-cleaning tables is passed first to four cyclone-type collectors which remove the heavy particles. The air from the cyclone-type collectors bearing the finer particles of dust passes into units of the cloth filter type (Pangborn), where those finer particles of dust are finally removed. This 50-mesh x 0 coal is stored in one of the two previously mentioned 100-ton storage bins, from which it is either blended with slack or nut-slack or used as fuel for the heating-plant boiler.

Middlings from the ⅜x⅛-in. tables go to the 1¼x⅜-in. wet-washing cone, while the ⅛-in. x 50-mesh middlings from the other tables are recirculated over these tables.

Twelve vibrating screens are used in the plant. The 1¼-in. x 0 raw coal from the main shakers is separated for dry cleaning on five Robins "Vibrex" double-deck units fed by rotary feeders. Two other "Vibrex" screens dewater and desand the rejects from the two cones. The other five vibrators are Allis-Chalmers, one handling primary dewatering of 1¼x⅜-in., another secondary dewatering of 1x⅛-in. and a third final dewatering of 1x⅛-in. coal. The remaining two Allis-Chalmers units rescreen the crushed coal after it has passed through 1-in.-diameter perforated plates on a Parrish-type screen, separating it into 1x⅜-in., ⅜x⅛-in. and ⅛-in.x0 sizes. The ⅛-in.x0 passes through aspirator boxes where the 50-mesh x 0 is removed, getting the same treatment as the raw coal ahead of the dry-cleaning tables. For dewatering the 5x1¼-in. coal another Parrish-type screen is used.

The main shaker screens, 10 ft. wide x 116 ft. long, with two 30-h.p. drives, consist of an upper scalping set with picking table and a lower sizing set. A crusher for stained lump is located under the lump table and two other crushers, primary and secondary, are under the sizing set. Sizes of these crushers (McLanahan & Stone), in the order mentioned, are: 24x30, 36x54, and 21x72.

Blending equipment for stoker and nut-slack sizes—all are blended—follows the general pattern in the company's other recent preparation plant, at No. 32 mine, in northern West Virginia (*Coal Age*, December, 1941, p. 45). Experience with that modern plant, also with Chance washer, aided in design of the Jenkins plant.

Three bins, including the two 100-ton units which function as storages to permit making nut-slack sizes omitting fines, enter into the scheme of automatically controlled blending. The other bin, 15 tons, 1x⅛-in. or ⅜x⅛-in., is a control unit. If the level in the 15-ton bin gets low, the speeds of the feeders from all three are reduced until the bin is refilled to a certain point.

The mechanism and control comprises "Bin-Di-Cators" at the several levels on each bin and feeder drives using Link-Belt PIV variable-speed gears equipped with small speed-changing motors. A panel of indicating lights shows the "Bin-Di-Cator" indication of levels in each bin. An extremely low level in any bin shuts down all feeders and an extremely full

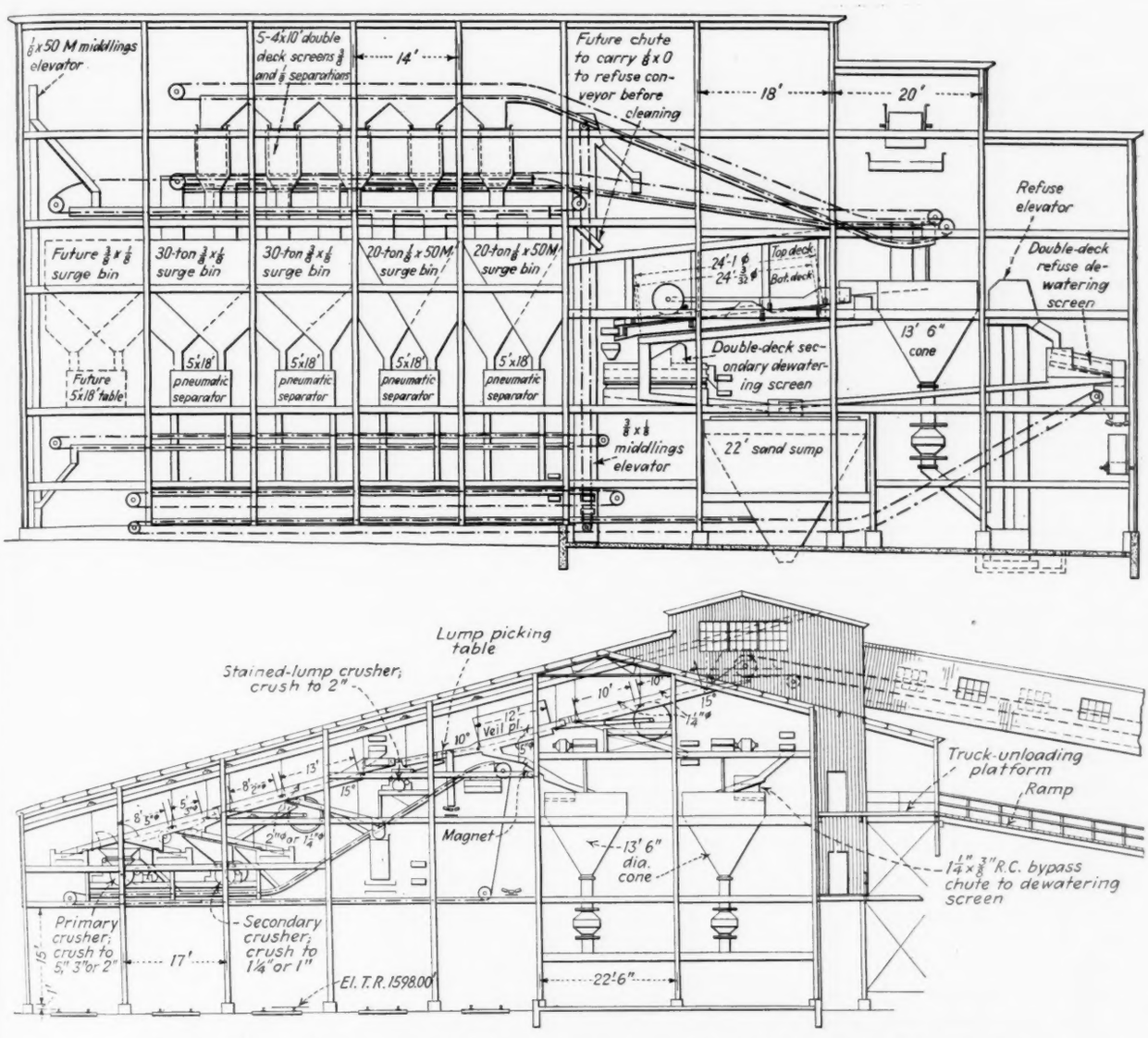


Fig. 2—Above, section through Bent 7 (Fig. 1) Jenkins plant. The 1¼x⅜ coal from the vibrators above the air tables is conveyed straight back to the No. 2 cone. Below, section through Bent B. The length of the main shakers, including scalping, picking and sizing sections, is 116 ft.

level stops sufficient equipment in the plant to arrest the flow of coal. In addition to the 14 "Bin-Di-Cators" in this blending service, eight automatically control the starting and stopping of the dry-cleaning tables to insure that they operate only with full feed, thus maintaining the uniformity and depth of bed necessary for uniformly efficient performance. Bin chutes to the air tables and other chutes and hoppers where fine coal flows are equipped with "Syntron" vibrators to keep the flow uniform and prevent clogging.

Complete bypassing arrangements are available for both sets of dry-cleaning tables and for each washing cone. This involves blinding the scalping screens, operating the plant at reduced capacity so as not to overload the sizing screens and going to a 1x1¼-in. nut-slack bottom size.

The heating boiler (Erie City) is in a separate building close to the preparation plant, but the pneumatic equipment feeds the 50-mesh x 0 dust to the boiler from a bin in a nearby corner of the main plant. From this automatic equipment a 4-in. pipe automatically conveys the fuel to the furnace. Other automatic equipment includes a Copes feed water regulator and an A. W. Cash combustion control.

Pipelines for dustless treatment of shipments so ordered are installed in a loop system with a companion line in contact or in close proximity at all points in which hot oil is circulated for maintaining proper temperature of the treating mixture. Solenoids connected in the operating sequence automatically open and close the spray-nozzle valves.

Refuse from the wet and dry cleaning equipment is handled over the refuse belt previously mentioned to a bin located on the hillside. This belt, rated at 125 tons per hour, operates at 240 f.p.m. and is a "Cord" design made by Goodrich. The return side of the belt rests on rubber-disk idlers spaced 10 ft. apart. This type idler was used because the wet refuse would tend to cling to the belt and build up on tubular idlers, whereas with this type the disks penetrate the built-up material and cause it to fall off.

Sludge is pumped 3,000 ft. back into the mine by a Goyne 450-g.p.m. pump operating at 1,175 r.p.m. and direct-driven by a 60-h.p. General Electric Type K 220-volt motor. Pumps and motors for the two pumping units for each cone also are G.E. Recirculating pumps, rated at 3,300 g.p.m., are driven by 100-h.p. 2,200-volt motors, and the sand pumps,

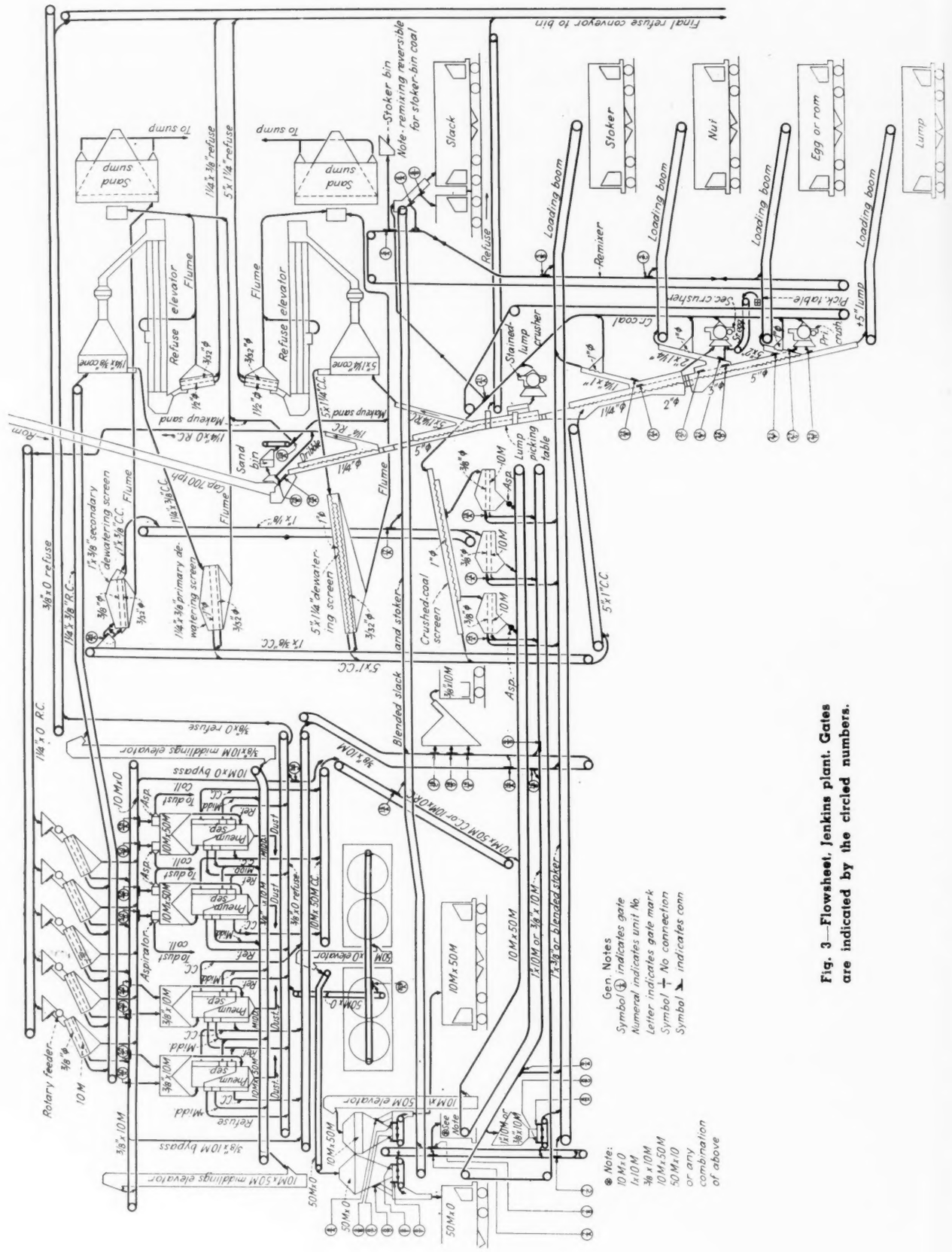
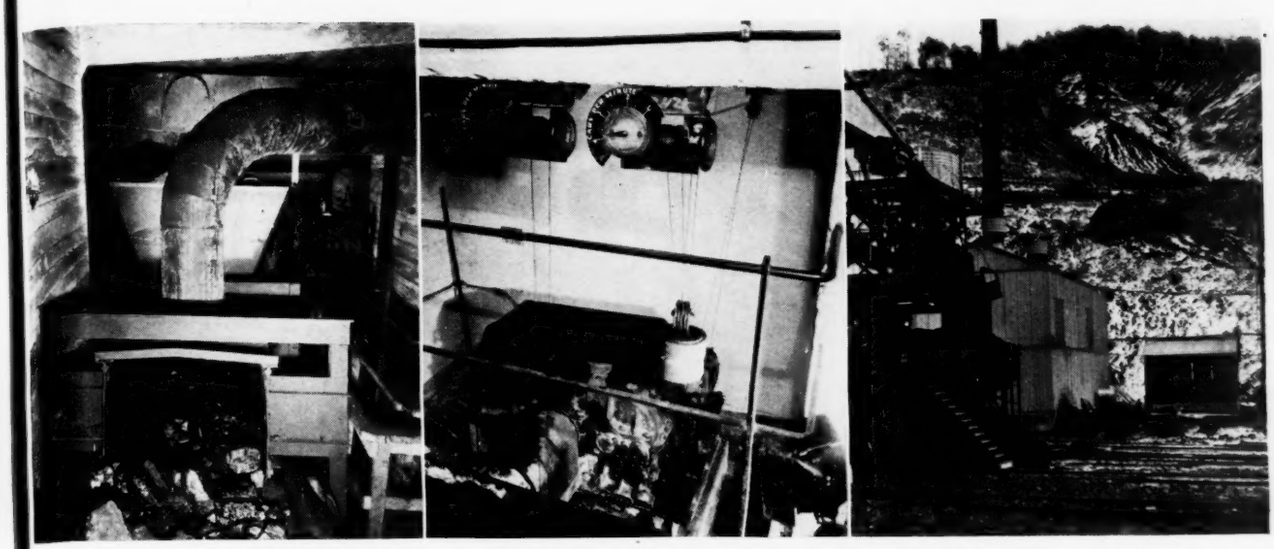


Fig. 3—Flowsheet, Jenkins plant. Gates are indicated by the circled numbers.



Left, hood over the belt feeder and exhauster pipe to air tunnel. The rectangular duct in the background connects to two collector hoods around the dump hoppers. Center, variable drive for a trip feeder and above it the adjustment wheels and speed indicators for both such feeders. Right, showing in the background the fan which ventilates the bottom and pulls dust from dumps and feeders to an underground spray chamber. The two buildings to the right of the main plant are the heating plant and pump house.

1,500 g.p.m., are driven at 695 r.p.m. by 40-h.p. 220-volt motors.

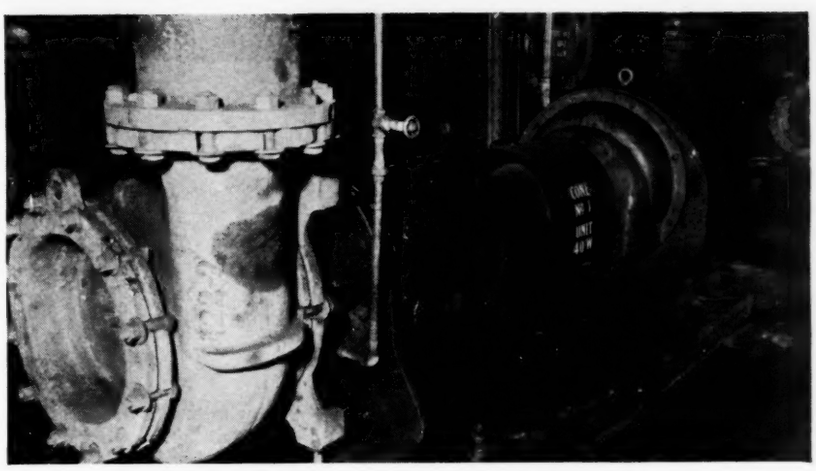
Wet washing is done at 1.40 gravity. On the 5x1¼-in. cone the size selected for testing and control is 2x1¼-in. and in this cleaned product the sink averages 0.4 percent. Float in the refuse (5x1¼-in.) is 0.3 percent. On the 1¼x ¾-in. cone, the control size is 1x⅜-in. and the sink in that fraction of the cleaned coal is 0.7 percent. Float in the refuse (1¼x⅜-in.) from this cone is 0.7 percent. These washing operations bring the ash down to practically that of the lump coal from the seam, or approximately 3 percent.

Dry cleaning tables operate at 1.55 gravity. For control of both washing and air cleaning, samples are collected manually once an hour and tested by float-sink. For uniformity in car loading a Brown-Fayro layer-loading hoist driven by a Westinghouse 220-volt motor is installed for the slack and nut-slack track. A tramp-iron magnet in the chute to the 5x1¼-in. cone is energized by 250 volts d.c. from a 10-kw. motor-generator.

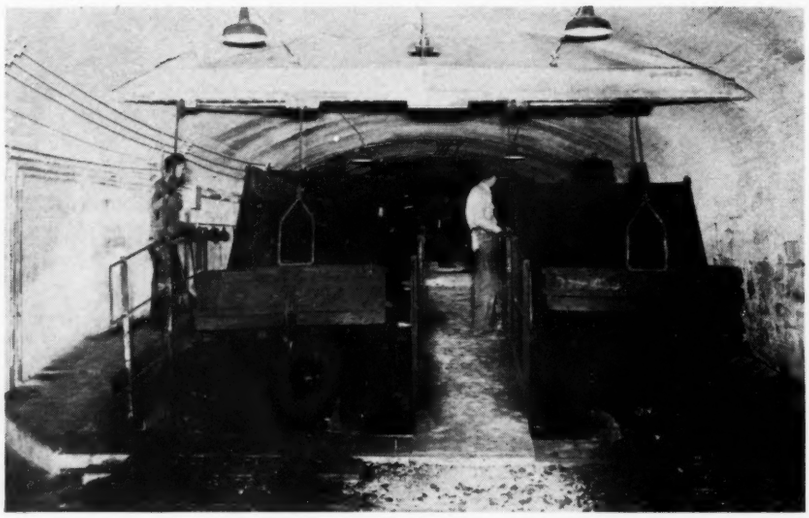
The steel structure is of strong design, well braced and free from objectionable vibration. The entire structure is fireproof and the total steel used for the outside plant was 830 tons, including a sand house and the refuse-belt structure.

Blue mud, 18 ft. deep, constitutes the ground at the tipple site. Hence, it was necessary to drive piles for all foundations. These piles, designed for 25 tons load each, were driven to refusal, averaging 22 ft. below the surface. The number of piles consti-

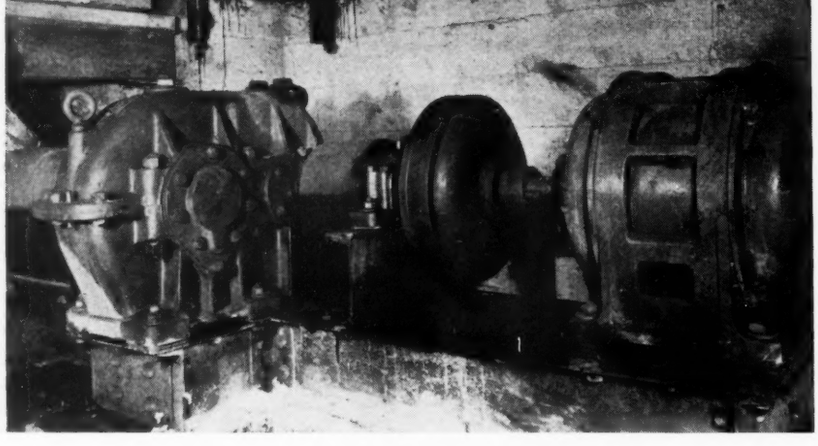
Adjustment wheels and indicators for feeders from dump hoppers to belt.



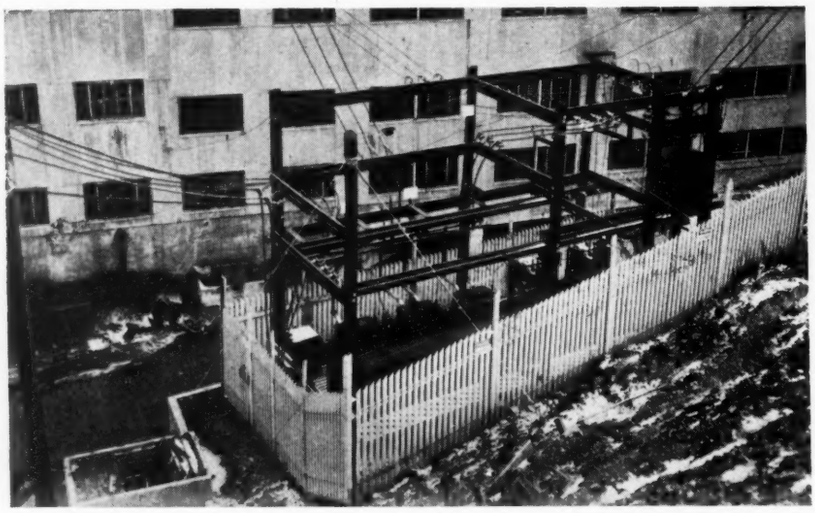
Two 3,300-g.p.m. pumps recirculate cone water.



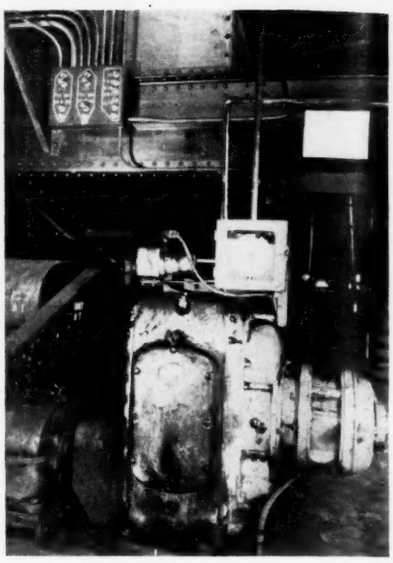
Two electrically driven crossover dumps on the double bottom.



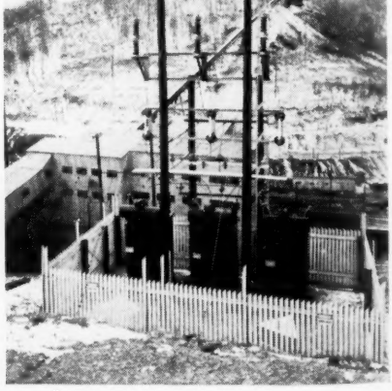
Each trip maker is protected from shock by a hydraulic coupling between motor and speed reducer.



The secondary substation (2,300/220 volts) has two oil switches, three 333-kva. transformers and fourteen 45-kva. 220-volt capacitor units. Feeding the plant are two 2,200-volt and three 220-volt entrances.



In the foreground is a motorized variable-speed transmission driving the slack blending feeder. Atop it is the speed-adjusting motor of the automatic equipment. Upper left are the level indicators for the three blending bins.



Voltage reduction from 40,000 to 2,400 is accomplished by three 667-kva. transformers. In the rear is the refuse belt and disposal site.

tuting each pier ranges from one to seven. Caps of concrete 21 in. thick extend down 6 in. below the tops of the piles.

The building is 138 ft. wide through the shaker screen bent and the length is 149 ft. through the bent that includes the air-table section. Including loading booms and the steps to the trimmers' platforms, the plant length is 198 ft. Sheeting is 2½-in. corrugated steel, 2-oz. galvanized; No. 22 gage on the roof and No. 24 on the sides. By design arrangement and steel partitions the structure is divided into three parts: dry plant, wet plant and tipple. Power and control design follows the same general three-part scheme. Lighting for the picking table is provided by skylights and a battery of fluorescent units. The skylights are installed only over the bent containing the main shaker and the total of this glazed area is 780 sq.ft.

To provide convenient and quick communication between control stations and certain other places in the plant, a total of six Western Electric two-way communicating stations are installed. Loud speakers can be heard above the plant noise and the microphones are the directional type which, when a man stands close to talk, transmit very little of the plant noise.

All bearings of shafts up to and including 5-in. are mounted in Timken-equipped pillow blocks. Stainless-steel cloth is used on dewatering and refuse-desanding screens. Blinding difficulty encountered at first on the raw-coal vibrators was circumvented by rearranging the screen cloths of the two decks so that the first ⅛-in. screen is now scrubbed by 1¼-in. coal instead of by ⅜-in. (see p. 99 of this issue).

Showing the main belt where it lifts the coal from the dump-bin feeder to coal-seam level.

Water is taken from Elkhorn Creek, which runs under a corner of the plant and is dammed just below it. Pumping is from a sump, or well, connecting with the creek through a concrete filtering chamber. Storage consists of two 75,000-gal. wooden tanks on the hillside. The pump house, near the well, has two 150-g.p.m. supply pumps and one 300-g.p.m. fire pump.

To serve the new plant, the railroad tracks 4,500 ft. above the tipple and 3,000 ft. below were completely rebuilt to provide space for 150 empties and 200 or more loads. The mine fan, a Jeffrey 5-ft. Aerodyne, supplying ventilation to the bottom and acting as a dust-collecting exhauster, is at the top of a 35-ft. air shaft near the outcrop and within 150 ft. of the plant. No dust is visible from its return, for back underground, near the dump, in a return-air expansion chamber at the termination of a tunnel from hood ducts, two sets of water sprays are operated continuously during dumping. This spray water comes from mine-dewatering pumps close by. The sludge accumulated in the spray-chamber sump is pumped out to the tipple, whence it and the washer sludge is pumped to the abandoned section of the mine. When this water flows out through an outcrop opening on the opposite side of the mountain it has dropped all solids.

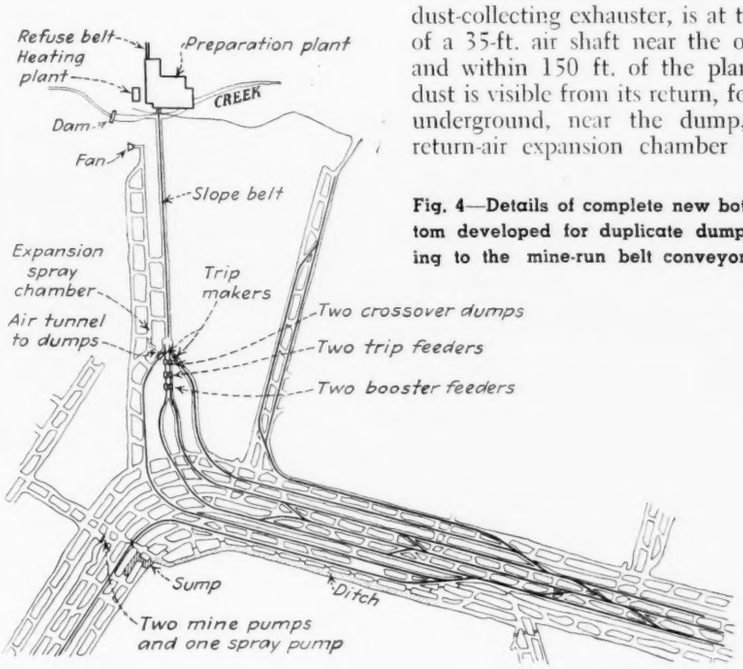
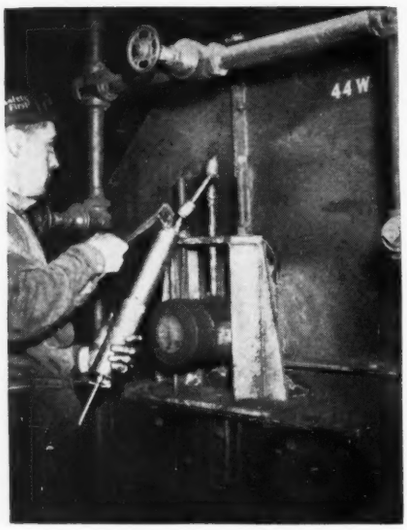


Fig. 4—Details of complete new bottom developed for duplicate dumping to the mine-run belt conveyor.

The duplicate car handling, dumping and belt feeding equipment on the bottom includes two Fairmont booster feeders, two Fairmont car feeders, two Fairbanks-Morse springless 20-ton scales, two Phillips No. 7 crossover dumps with safety dogs (electric drives) and two Fairmont trip-makers.

On each trip feeder, installed between the 15-h.p. 1,160-r.p.m. General Electric motor and the Jones 42:1-ratio herringbone speed reducer, is a Link-Belt PIV-gear variable-speed transmission, 3:1 ratio. To the speed-change indicating dials, installed at eye level on the rib near the dumps, were added rims calibrated in cars dumped per minute. This convenient means of controlling the speed of cars fed from each loaded track to its dump, and similar adjustable feed control on the reciprocating feeders under each dump hopper, accomplishes the blending which, because of the wide variation in impurity content of the coal as received, salvages tonnage that might otherwise be lost.

As a necessary adjunct to the adjustable dumping speed, each reciprocating feeder from the dump hopper to the common loading point of the



Greasing the refuse elevator per schedule, using the lubricant specified in the plant chart.

Fig. 5—Typical drives for conveyors and loading booms.

mine-run belt has a PIV variable gear of the same size and type. The calibrated rims of their dial indicators, also beside the dumps, show a range of 200 to 600 tons per hour.

To prevent trip-maker chain breakage and to relieve generally the mine cars and drive mechanism of shock, each trip maker has a hydraulic coupling (American Blower Co.) between the General Electric 20-hp. 220-volt, 1,170-r.p.m. motor and the Jones herringbone 13.3:1-ratio reducer.

Power for the 128 motors (totaling 2,136 connected horsepower) for the surface plant and mine bottom is received through two new transformer substations. The primary, 200 ft. from the plant, has three 667-kva. General Electric 40,000/2,400-4,060-Y transformers. The secondary substation, within 40 ft. of the building and made up of two General Electric oil switches and three Westinghouse 333-kva. 2,400/240-volt transformers, includes fourteen 45-kva. General Electric capacitor banks (three units each), totaling 630 kva., connected to the 2,400-volt buses.

The seven largest motors (three 125-hp. and four 100-hp.) operate on 2,200 volts. On the smaller sizes, all under 60 hp., a 35-hp. unit at the end of the refuse belt is the only one operating at that higher voltage instead of at 220 volts. Obviously, that was to save copper and obviate the use of another bank of transformers.

The bulk of the motors in the new plant are General Electric. Exceptions are four Robins & Myers units driving boom hoists; two Westinghouse, one on the layer-loading hoist and one on the magnet motor-generator; two Master, water-supply pumps; and one U. S., fire pump. All are standard construction except that five splashproof motors are used in the wet-washing plant and four totally inclosed in other special locations.

Ninety-eight of the motors have sleeve bearings and 30 have ball bearings. As a rule, Consolidation specifies that all motors of 1,800 r.p.m. or greater speed shall be ball-bearing. That specification may also be applied to slower speed motors where sleeve bearings have proved troublesome, for instance on 1,200-r.p.m. motors mounted on vibrating screens.

Control-Room Service

To each of the three control rooms (tipple and wet and dry plants) a separate 240-volt service line is run from the secondary substation transformers and in each case a 1,200-amp. air circuit breaker protects the buses. In addition to the many 220-volt starters, each control room has two or more 2,200-volt starters serviced by two 2,400-volt lines from the secondary substation. Rigid conduit is used for all entrance lines and power, lighting and control wiring. A short length of flexible conduit is installed at each motor power connection lead, permitting easy removal or sliding base adjustment.

In each control room, Bus "B" of the three 220-volt buses ("A," "B" and "C") is grounded and lines from it are the common conductor for all indicating lights and all control circuits. All of these controls are operated from Buses "B" and "C." Any additional ground on any phase-"B" control wire has no effect on the control system. Each control circuit connection to Bus "C" is made through a 10-amp. fuse, so that accidental ground in any of these phase-"C" control wires will blow a fuse purposely and cannot operate any of the equipment accidentally.

Eighty-three of the plant motors have their controls connected to start in automatic sequence, but the exact sequence arrangement for a certain combination of coal grades is determined by prearrangement of each motor control setting. The desired sequence of operation in starting and stopping is accomplished from two master stations, one on the trimmer's platform between Tracks 1 and 2, and the other between Tracks 3 and 4. These master operating stations are interlocked so that only one may be used at a time, depending on the selection manually set on the master selector control station in the tipple control room. Pushbuttons are arranged for cutting any motor out of sequence and for operation of any one separately. Sequence of control operation is in the opposite direction to coal flow. If a motor operating in sequence stops from overload or otherwise, all motors operating machinery feeding coal to that point will stop, thus eliminating piling up of coal, etc.

Charts and tables for determining what spare parts are considered vital for the maintenance program include listings of the three types of drives (V-belts, gear reducers and chains); also all pillow blocks and bearings other than in motors. Using V-belts are 51 drives, requiring 226 individual belts. Of these, "Cog-Belts" include 17 sizes, 40 drives and 176

MAINTENANCE SCHEDULE—NO. 207
PREPARATION PLANT—10-23-42

2-week—Schedule "C"

(a) Drain and flush with light oil all sand- and sludge-pump bearings, refilling with correct lubricant as per lubricating chart:
Unit 42-W No. 1 Cone sand pump
48-W No. 2 do.
112-W Sludge pump
138-W Emergency sludge pump
120-I. S. Dump sump pump

(b) Change oil in compressor: Unit 109-D air compressor.
Refer to lubricating chart for correct lubricant.

(c) Drain outer reservoir in sand sump and clean out all solids around suction pipes.

(d) Inspect ventilating-fan equipment: Unit 130-S ventilating fan.

(e) Inspect water-storage and inside pumps:
Units 135-O. S. Water storage tank pump
136-O. S. do.
118-S Mine sump pump to sprays
119-S Spray sump pump
120-S Dump sump pump

(f) Dust collecting: Check rotor inside of gate body and all other discharge attachments for proper sealing.

individual belts; and the "Tex-Ropes," three sizes, 11 drives and 50 individual belts.

Drive chains and sprockets, all Link-Belt RC80, constitute 20 drives requiring 46 sprockets but only 13 different sizes. Forty-nine drives consist of, or include, gear or worm reducers or variable transmissions. By types and individual units these are: Jones herringbone, 25 and 33; Falk horizontal double-reduction right-angle, 1 and 1; Falk right-angle, 130:6 ratio, 1 and 2; Link-Belt herringbone, 1 and 1; Link-Belt variable speed transmissions, 3 and 6; Cleveland worm reducer, 3 and 4; and DeLaval worm reducer, 1 and 2.

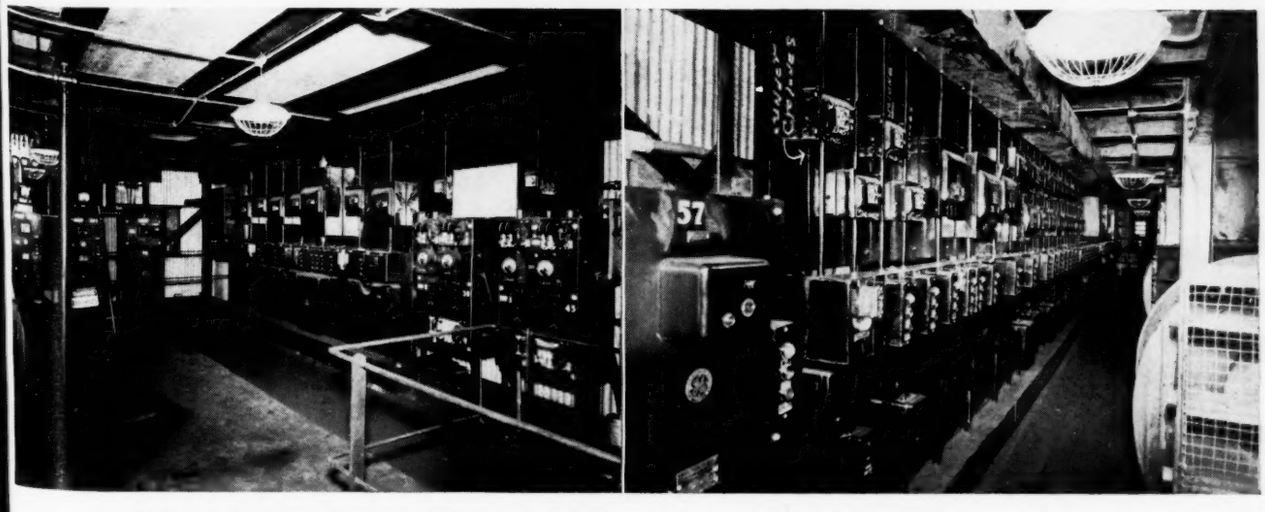
A partitioned room in the main plant, in the main shaker bent and next to the roof, has been fitted with shelves, bins, stalls and racks for storing spare parts, such as screen cloths and plates, bearings, chains, sprockets, gears and electrical parts for the Colt safety switches and General Electric starters. So that maintenance men will have no excuse for picking out of stock and installing the wrong relay heaters or fuses, the catalog numbers of the former are painted inside the cover of each starter and the amperage of the correct fuse is painted on each safety switch.

For convenience in plant operation and maintenance every unit of driven machinery is assigned a number and that number is painted in large numerals on it, be it a pump, cone, conveyor, screen, air table, etc. Flowsheets, spare-parts lists, lubrication charts and maintenance schedules all refer to those numbers.

The maintenance schedule shows all items of inspection, lubrication and cleaning to be performed daily, weekly, every two weeks, etc. On these sched-

Plant supply room. The equipment is highly standardized so that a minimum of spare parts affords shut-down insurance.

Inspection and lubrication are done according to schedule. Here, the packing nuts on a cone refuse gate are being taken up.



Left, wet-plant control room, including cone controllers at the right. Right, dry-cleaning-plant control room. Unit No. 57 (left) is a 2,200-volt starter panel. The remainder are 220-volt safety switches and starters.

ules each unit of machinery is indicated by name and number, also by a suffix to the number. For instance, a "W" shows that the control for this unit is located in the wet control room and also determines the general location of the unit in the plant. Correct lubricant and lubricating method for each item in the plant are listed on a separate chart.

Consolidation Coal Co. operating officials and engineers directly concerned with design and construction of the new plant or now charged with its operation include the following:

Headquarters at Fairmont, W. Va.: W. L. Doolittle, vice-president in charge of operations; M. H. Forester, general manager of operations; F. G. Koper, chief engineer; W. D. Steele, preparation manager; J. W. Murry, construction engineer; R. L. Kingsland, electrical and maintenance engineer; W. F. Haley, assistant electrical and maintenance engineer.

Headquarters at Jenkins, Ky.: J. D. Snyder, division manager; J. O. Watson, 3d, assistant to the division manager; M. E. Prunty, superintendent; B. V. Kegan, general mine foreman; J. H. Hunter, division coal inspector; W. E. Wright, tipple foreman; A. A. Gilmore, division maintenance superintendent; R. L. Blake, maintenance foreman; L. E. Kelly (formerly division engineer but now chief engineer of another company); R. J. Howard, division engineer; and B. H. Atkinson, assistant division engineer.

2,200-HP. HOIST
Survives Storage and Fire Before Use

One of Nine Purchased in Electrification Program Going Back to 1921, 2,200-Hp. Old Ben No. 15 Hoist, After Long Idle Period and Reconstruction After a Fire, Is Put Into Service in 1942

BOUGHT in 1923, probably no other major coal-mining equipment has been through the vicissitudes of the hoist put to work late in 1942 at Mine No. 15, Old Ben Coal Corp., West Frankfort, Ill. One of nine, including the unit which now serves the Jackson Park "coal mine" in the Museum of Science and Industry—a showplace for Chicago sightseers—the story of this hoist starts with the purchase of what is now known as Mine No. 11, back in 1917, when coal was winning the Hohenzollern World War. This mine, when opened in 1912, was equipped with the first flywheel Ward Leonard electric coal hoist to be built in America. Its own electric power plant supplied energy. Other mines, acquired about the same time, brought the Old Ben operations in the Franklin-Williamson County group to twelve. These others were equipped with steam hoists.

After the change in ownership Mine No. 11 continued to produce its allotment of coal. At the end of a year, a comparison of costs at the several mines put it at the head of the list, with a surprisingly lower power cost than any other mine in the group.

These results stimulated a survey to determine what ailed the other eleven mines. Unlike manufacturing industries, coal mines are dependent on the fickleness of day-to-day markets and car supply. But power plants must be ready, whether used or not. One thing this survey uncovered was: keeping an idle power plant ready to pick up its load was expensive. Average power cost per ton of coal mined was found to be excessive, with the entire range away above the power cost at Mine No. 11.

Before committing itself to an all-out program of electric hoisting, Old Ben decided to use Mine No. 18 as a check on the Mine No. 11 record. Therefore, in 1921, a Nordberg hoist, powered by 900-hp. General Electric-Ward Leonard electrical equipment, was purchased. Power for the entire mine operation was brought from No. 11 over a 33,000-volt transmission line, a 2,500-kw. turbo-generator having been added to take care of the growing load.

The resulting power cost for Mine No. 18 was gratifying—so much so that in 1922 electric hoists were ordered for two smaller mines, Nos. 17 and 20. These were driven by 350-hp. induction motors. Some of the ill winds that now and then harry the coal industry prevented the No. 17 hoist from actually handling coal until it was removed to the Chicago "mine."

In 1923 came the climax of this extensive project. Seven Ward Leonard hoists, totaling 10,900 hp., were ordered. Of these, five were General Electric with Nordberg drums and other mechanical parts, and two were completely Allis-Chalmers. This completed the plan to electrify all hoists except Mine No. 10, which was soon to be worked out. With this added load, so much electric power was required that in 1924 a contract was entered into for the entire power needs of the Old Ben Coal Corp. to be furnished by Central Illinois Public Service Co. This included about 25 300- and 500-kw. motor-generator sets, ventilating fans and tipple motors.

By 1925 all electric hoists had been installed except the one for Mine No. 15. Declining coal business made it imperative to retrench. Schenectady, too, was in the doldrums and had unused space. A deal was made to let the huge machine hibernate there—perhaps for the duration of the depression. Eventually, the electrical business revived, but the fortunes of coal were still out of joint. Space at Schenectady began to command a premium. The sleeping giant had to be disturbed long enough to be transferred to Mine No. 15, where it went into solitude again for more years.

In the meantime, during the two-year construction period, an astonishing fact came to light. The savings from the newly electrified mines had paid for all the new hoist equipment—this in spite of the fact that two of

these hoists had not lifted a pound of coal from underground—and have not to this day. But even that miracle could not counteract the depression. So the 2,200-hp. Titan slept on.

This Mine No. 15 hoist, a duplicate of the hoists at Mines Nos. 8 and 9, has two cylindro-conical drums, each consisting of 7- and 11-ft. cylinders grooved for 1½-in. steel hoisting rope connected by four turns of conical step-up grooved drum, mounted on a 16-in. shaft. Each drum is fitted with a hydraulically operated brake, faced with wood-wearing blocks. A set of double reduction gears transmits power from a 125-hp. slip-ring motor to the drum for handling idleday material. This makes it unnecessary to start the flywheel set for maintenance work. The 2,200-hp. 110-r.p.m. 600-volt d.c. hoist motor is connected directly to the drum shaft. Power for the hoist is supplied by a 1,500-kw. 600-volt d.c. generator driven by a 1,000-hp. 2,300-volt slip-ring motor, with a 20-ton steel-plate flywheel mounted between the two. Speed of the set is 514 r.p.m. These three identical hoists at Mines No. 8, 9 and 15 are the largest single-motored equipments applied to hoisting coal in the United States.

Flywheel Speed Regulation

Speed regulation of the flywheel is accomplished by a water-filled slip regulator wired in the secondary circuit of the 1,000-hp. driving motor. Soda in solution gives the water sufficient conductivity. The terminals in the regulator are automatically separated under load, allowing the flywheel to slow down and give out energy, and closed when the hoist is idle or decelerating, causing the flywheel to absorb energy and speed up.

In operation the control lever is thrown into high by the hoistman, but acceleration and deceleration are both controlled automatically by a set of cams driven from the drum shaft. The cams actuate a controller drum which, in turn, switches current to relays that vary the excitation of the hoist generator and motor.

By 1941 the coal business was looking up. It was decided that the hoist which had slept for so many years must be put to work. A new fireproof house was built just behind the operating steam hoist. The mechanical parts, including the base of the flywheel set, were put on the foundations. The 125-hp. auxiliary motor, the exciter, the top half of the hoist-motor field frame and the slip regulator were in the new building. Then came the early morning of Sept. 10. Shortly after midnight the watchman discovered smoke coming from the temporary building in which the electrical machines were stored. The alarm was turned in. Before help arrived the damage was done. It doesn't take much fire to ruin electrical equipment, and water did more damage to some of the hot iron parts.

Insulation was burned from the coils, commutators were softened, varnish was burned from laminations, a motor frame cracked beyond repair and flywheel rivets were broken. It was a sorry prospect. On the other hand, the control was housed separately and was saved. There was considerable salvage value in the burned material and there was some insurance. Work already had progressed so far that it was decided to recondition the ruined parts. The tedious job of rebuilding these heavy machines far from customary facilities was tackled.

First, a new technique, the "magnaflux," was used to determine if there were cracks around the keyway of the steel-plate flywheel. An arc-welding machine furnished the needed current, about 200 amp. Two or three loops of cable around the shaft determined the ampere turns. With current flowing, finely pulverized iron was sifted around the keyway with a salt shaker. No trace of a crack was detected. This method will trace cracks quite beyond the range of visibility.

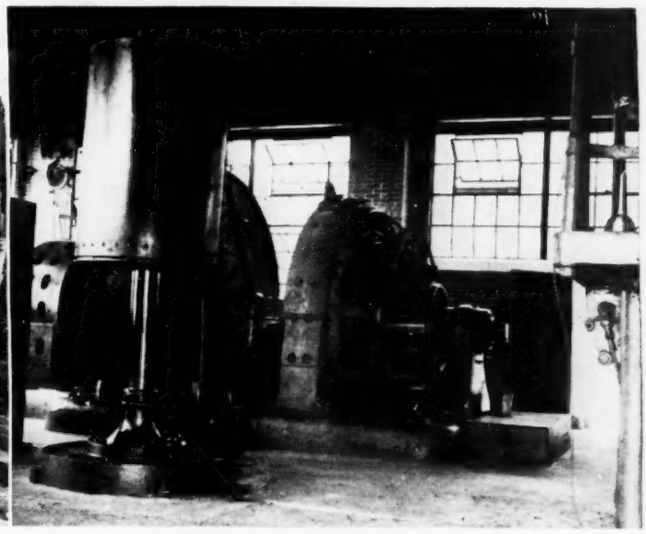
The several plates making up the flywheel had to be reriveted—an exacting job to preserve the running balance.

Stator Arc-Welded

A new stator frame was required for the 1,000-hp. slip-ring motor driving the flywheel set. It was fabricated from steel plate by arc welding, the modern construction for large machines. Stator and rotor windings for all machines are new, along with commutators. The fields were reconditioned in General Electric service shops. The rewinding was done on the job by the mine electrical force, with supervision by a G. E. service man.

Armature punchings for the hoist generator and motor were returned to the factory for reconditioning and were restacked at the mine. The hoist-motor armature has 9,900 punchings, each about 20 in. long. Twelve are required to complete the circle; 825 for the thickness of the rotor—about 40 to the inch of thickness. Before the last few layers were put on, the stack had to be compressed by bolting on the retainer ring, which then was

After the fire.



Rebuilt and rolling.

removed so that final layers could be added. The ring then was bolted on for keeps.

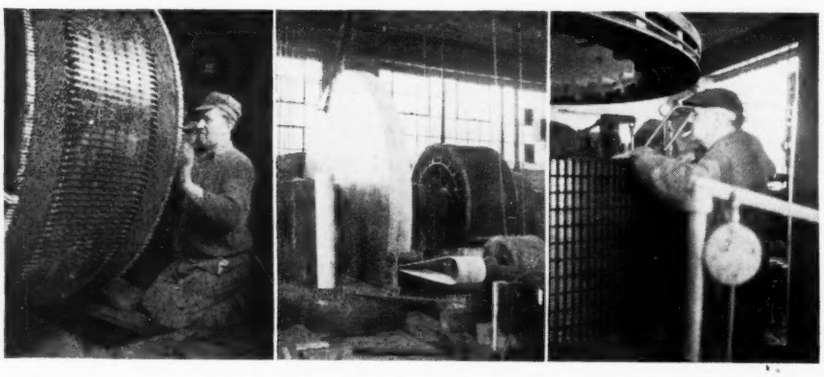
Banding of the motor and generator rotors of the flywheel set was done by driving them with a d.c. motor regulated by a water rheostat. The motor was belted to the flywheel. This worked very satisfactorily.

The armature bands for the main hoist motor were prefabricated at the factory. These were made up in short sections, with a series of parallel loops at each end that interleave to provide for the insertion of steel keys to make the band continuous. Before applying the permanent band, the armature was temporarily banded to draw the coils down into the slots. Power to turn the armature was supplied by the small hoist motor, geared to the drum shaft. A sufficient number of sections of the permanent band was applied to reach around the armature. The closing section of the band had to be made up on the job. As an aid in getting the exact length adjusted, the keys were made up in three widths.

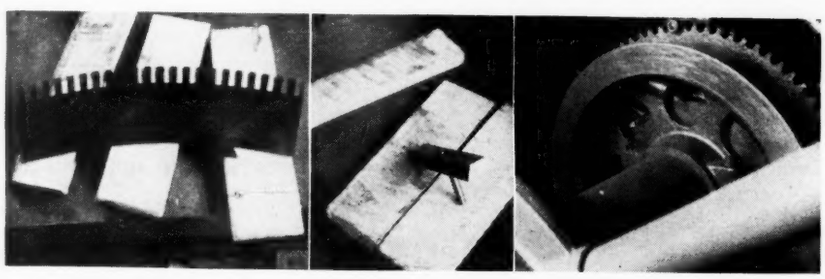
A handy contrivance was used to get proper tension in the band. Each section has a rectangular lug soldered across its width within the loops at each end. A special clamp, with milled slots to straddle the loop wires, engaged these lugs. Tightening bolts drew the sections together until wedges could be inserted.

Fast hoisting necessitates ringing the cage away before the car is locked on the cage. Besides that, a rope may break, or other accidents may happen. While extremely unusual, hoistmen also may become confused. To forestall wrecks, control wires are run to the caging point and the dumping point. By merely throwing a switch, control is taken from the hoistman, dynamic braking applied, the mechanical brakes are set and the cage is stopped. Under normal operation, the cager keeps his hand on this switch until he sees the car is locked on the cage. This device has saved many shaft wrecks at other mines.

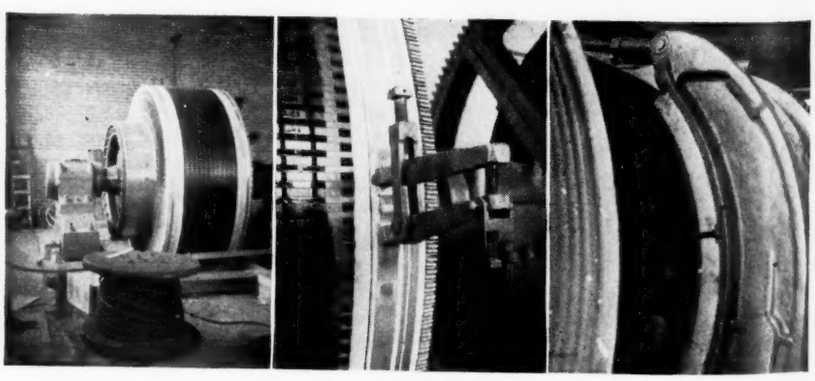
The normal load for this hoist is 4.2 net tons of coal per trip, 200 hoists per hour. The maximum rope speed is 3,840 f.p.m. The brother hoist at Mine No. 8 has a record of 1,613 hoists in an 8-hour day with 14 minutes' lost time. Record number of hoists for one hour was 208.



Final licks, rotor winding. Banding drive on flywheel. Placing last lamination.



One of the 9,900 armature core laminations. **Tool to force laminations into the armature dovetail.** **Rope take-up wheel on the hoist drum.**



Armature in place. **Band clamped on.** **Wood-lined brake.**

MODERN SHOP
Eases Mechanical-Mining Maintenance

New Central Machine Shop Supplements Electric Shop and Warehouse in Serving Four Mechanical Mines—Modern Facilities Include Cranes, Machine Tools, Metal Spraying and Welding and Precision Grinders

TO MEET the maintenance problems of modern mechanical mining, the Superior Coal Co., Gillespie, Ill., has built a machine shop of fire-resisting materials at its No. 3 mine. This shop is centrally located in reference to the company's four mines and serves them all. The other three are within a four-mile radius and are reached by rail and concrete highway. The central electric shop and the central warehouse also are located at No. 3 mine, thus coordinating these three elements in the maintenance setup.

The new shop is 40x120 ft. and 14½ ft. high at the eaves. The structural-steel frame was fabricated and erected by the company's mechanical department. About 5½ ft. of the lower part of the walls is brick. The remainder of the wall surface and the roof are covered with corrugated "Transite." Doors, window sash and skylight sash are steel. Wire glass is used for all daylight openings. The floor is concrete.

Heating is by five unit heaters located under the center of the roof, with louvers set to direct the heated air to the floor. Ventilation is aided by five rotary ventilator heads set at the apex of the roof.

Office space for the master mechanic is partitioned off in one corner. This office is furnished with a desk and filing cases, and is heated with a steam coil along the outer wall. Steam for all heating is from the mine boiler plant.

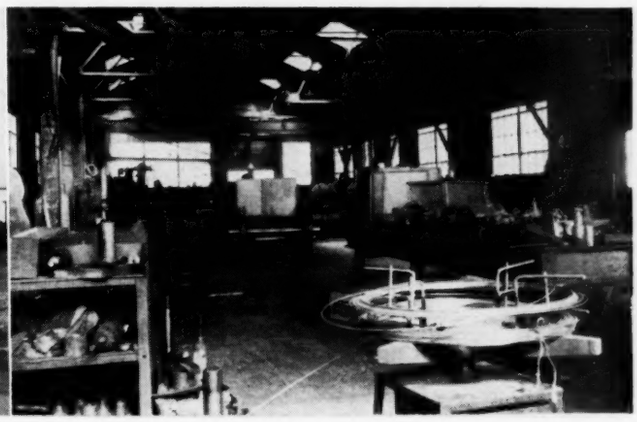
For handling heavy machines and parts from trucks into the shop, a chain block hung from an I-beam trolley is used. Within the shop all heavy material is transferred with a 10-ton hand-operated "Brownhoist" traveling crane having a 32-ft. span. The crane track is supported on steel columns separate from the building. There also are seven jib cranes, each equipped with a chain block hung from a trolley. These cranes reach and serve all machine tools in the shop except the large lathe. This lathe sets across the rear end of the shop and is served by the traveling crane.

The hydraulic press, machine tools, arc-welding booth and forge are all arranged along the side walls and across the rear end of the shop. The entire central space, more than 20 ft. in width, is open for working around machine assemblies, handling material and storing work which might be in progress.

The machine-tool equipment consists of a 400-ton hydraulic press, grinder, two medium-sized lathes, one heavy 36-in. x 10-ft. lathe, 20-in. shaper, No. 2 milling machine, a small drill press, a 60-in. radial drill, a power punch and the usual arc-welding equipment. The large lathe has 4-in. blocks for raising head and tail stocks and a 12-in. gap that increases the swing 2 in. at the faceplate. All the tools have individual electric drives. The two small lathes and the shaper are equipped with Cullman Wheel Co. motor drives. The large lathe has a similar drive made up in the shop. There are no lineshaft drives.

In the arc-welding section is a wheel-rotating device constructed in the shop from scrap material. This form of wheel rotator is not new, for it was built 25 years ago to rotate street-car trucks for building up worn wheel flanges by arc-welding. The idea is now used in the manufacture of range tanks and for welding other cylindrical objects. However, this is a novel installation for several reasons:

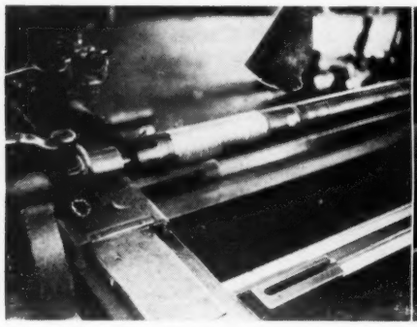
Skylights and large windows feature new shop.



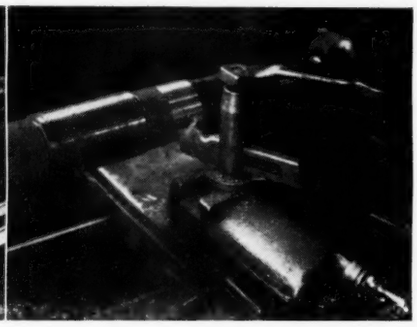
Interior—plenty of room; welded bench at right.

1. The driving mechanism is made of two worm-gear drives taken from discarded "Northern" hand-loading conveyors. They are geared in tandem, giving a very low rotating speed. Other parts came from the scrap pile.

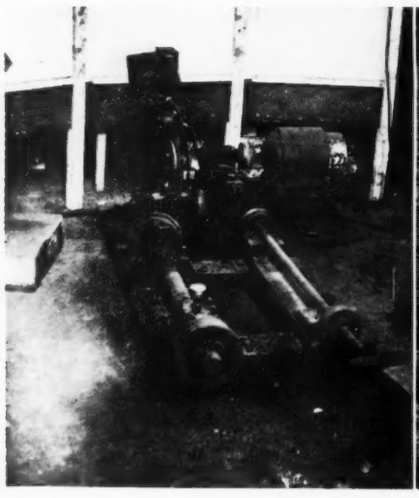
2. Tires, loading-machine wheels and axles and other circular parts are set on the rollers for building up by welding. The welding is done by hand, but the operator is relieved of fatigue because all he has to do is to maintain the arc. The work is rotated at the correct speed under the arc.



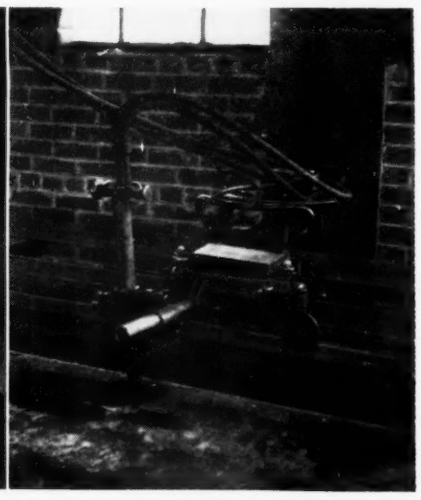
Threading in preparation for building up with sprayed metal.



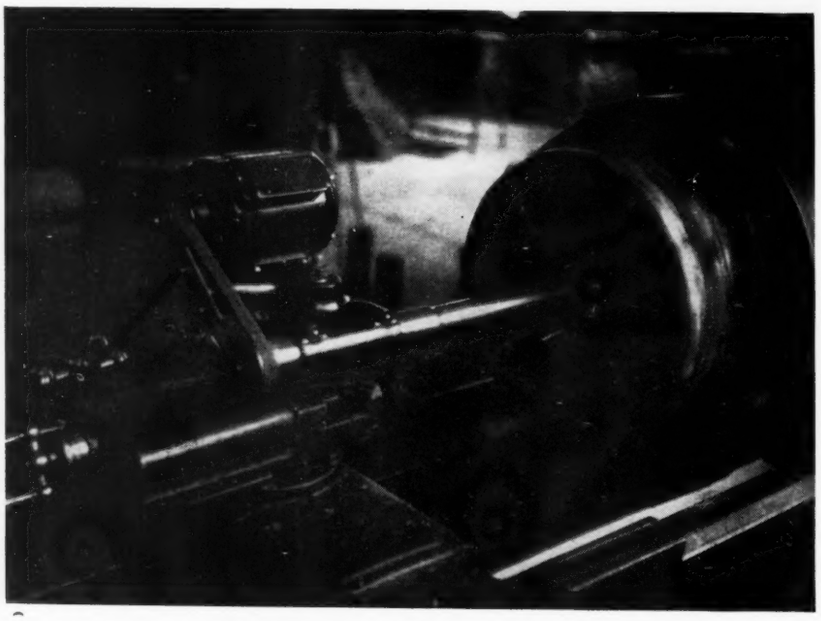
Finishing metal-sprayed shaft with an ordinary lathe tool.



Tandem worm-gear drive for rotating trucks or wheels in arc-welding.



Motor-drive gas cutting machine for cutting steel sheets.



Grinding a wheel bore with precision grinder mounted on lathe.

This progressive shop has acquired some tools so modern that few mining men have seen their sort of work done. These are a "Mogul" metal spray gun and Dunmore precision lathe grinders. Each of these tools is arranged for mounting on the lathe carriage when in service.

The spray gun will handle any sort of metal from lead to stainless steel. It will operate with acetylene or any one of several other gases and oxygen. It is used in this shop primarily for building up worn shafting and pump piston rods, although by no means limited to that type of work.

The grinders are used for external finishing of shafts and for internal grinding of wheel bores and other types of machine parts. Grinding is necessary where extreme accuracy is required and for finishing surfaces that are so hard they cannot be machined with ordinary tools.

Metal-Spraying Advantages

Of paramount interest to all coal-mining men who would recondition and prolong the life of machine shafts and other parts is the practical application of metal spraying. This shop has used a "Mogul" spray gun for several months. Its work has been so successful that it is now in everyday use. Master Mechanic D. W. Greene testifies to many advantages for the process: it is the cheapest way to recondition a mining-machine shaft; by the use of hard metal the life may be made longer than the original; worn bronze pump rods are made to look like new and as good as new; shafts are not warped as they are when built up by arc-welding.

Here is a description of how it is employed on the transmission shaft of a Goodman loading machine:

That part of the shaft to be built up is first rough-turned with a $\frac{1}{16}$-in. cut. Then a very rough thread, 16 per inch, is cut the full length of the turned surface. To prepare the base so the sprayed metal will anchor solidly to the shaft, the whole threaded surface is knurled to flatten and spread the high point of the thread. A cross-section of the thread then looks roughly like a letter "T." It is desirable to leave the whole surface as rough as possible; therefore a knurler is used rather than a roller. Oil or grease must not be allowed on the prepared surface. It must not be touched with the hand. If neces-

sary to hold for spraying later, it is protected with dry paper wrapping.

The piece is now ready for the spray. The gun is attached to the lathe carriage so the nozzle is 6 in. from the work. Wire feed and flame are adjusted until a cone is formed that extends about $\frac{3}{8}$ in. from the nozzle. While being adjusted, the flame is directed away from the work. The work is rotated and the metal deposited until sufficient thickness is built up for finishing. Usually a section is built up to size and then the carriage is moved over to a new section. The work is calipered as it progresses, calipers being inserted right in the metal stream.

It is interesting to observe that the apparent spread of metal is somewhat more than 15 deg., a large portion of the flame missing the work. Actually, however, not much metal is lost, a large percentage being confined to an area of $\frac{1}{2}$ to $\frac{3}{4}$ in. where it impinges on the work. The steel wire used is $\frac{1}{8}$ in. in diameter. The carbon content depends on the job; 0.25 percent for bearings and 0.10 percent where it is to be a press fit.

The quantity of metal to be turned off in preparation will depend on the permissible wear before renewal is required. The rule at this shop is to have sufficient depth of metal so it is not worn through to the threaded base at the time of a later renewal.

Finishing the sprayed work depends on the metal used and the accuracy of finish required. On the Goodman transmission shaft referred to, an ordinary lathe tool is used, the cuttings breaking up very much like cast iron.

Because of the heat from spraying, the shaft expands and near normal temperature must be reached before finishing may be completed. This will be appreciated when it is realized that 140-deg. increase in temperature will expand steel 0.001 of its diameter. Cost of this job is about 10 percent of a new shaft.

The threaded base need not always be 16 threads per inch. A finer thread sometimes is used (up to 22) in this shop. Surfaces of hard metal or irregular in shape may be prepared by sandblasting. This shop has not yet bought a sandblast but expects to do so.

The spray gun has an extra nozzle for using No. 11 wire.

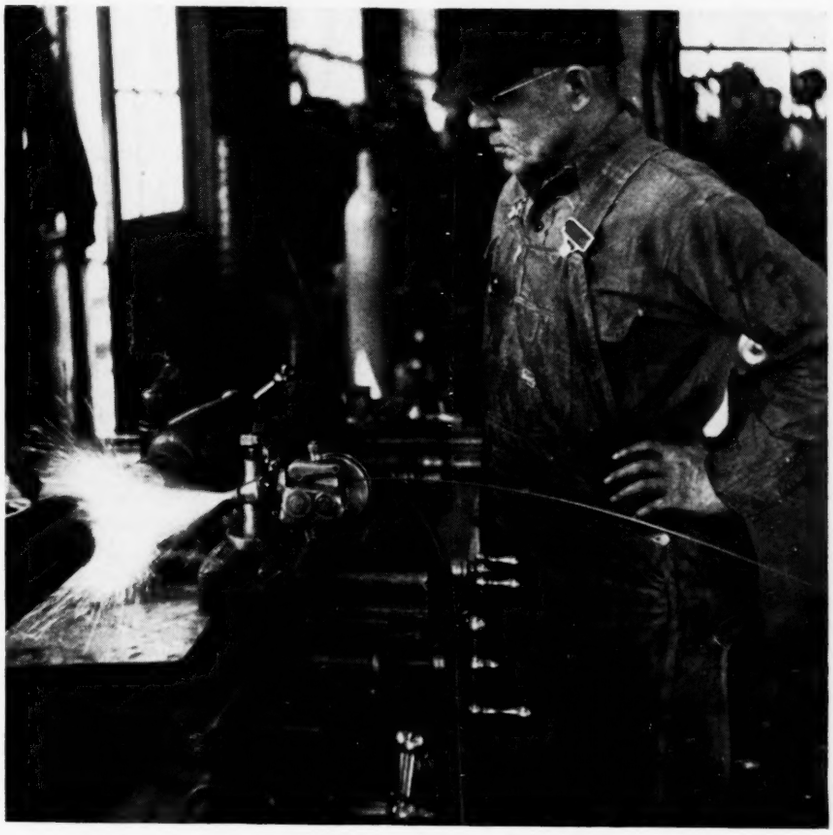
This shop has two of the Dunmore precision lathe grinders, used for finishing surfaces requiring great accuracy, high finish or too hard to be finished by usual methods. These are light in weight and may be quickly attached to the lathe carriage. They are used for finishing both inner and outer cylindrical surfaces. Since only very light cuts can be taken, the rough finish is held as near as possible to final dimensions.

One of the jobs done with the internal grinder is grinding the wheel bore of Goodman loading-machine trucks. Wheels are pressed from the axles and the treads are built up by arc-welding. This reduces the bore, which is ground to a re-press fit.

The Superior mines operate four steam hoists and several engine-driven d.c. generators. Because of very successful results, all these are equipped with metallic packing on the piston rods. A set of packing lasts up to three years without change or adjustment.

To minimize cylinder wear in these engines, pistons are inlaid with a soft metal to carry the weight with a minimum of friction. A wide dovetailed groove is turned in the circumference of the piston between the ring grooves. Perhaps some ring grooves may have been in the dovetail area originally.

Preformed sections of "Red Metal" are laid in this wide groove and peened into place. Besides being curved circumferentially, the cross-section of these blocks is curved so that it spreads to fill the dovetail when hammered into place. The inlaid metal is then turned to cylinder fit. In service, the cylinder walls take on a high polish and indicate little wear.



Spraying on steel to build up a worn loading-machine drive shaft.

AIR SURVEYS
Indicate Air and Power Savings

Frequent Air Surveys Will Show How Ventilation May Be Improved to Eliminate Air Waste and Save Power—Survey Methods and Equipment —Calculating and Interpreting Results of Mine Ventilation Surveys

By J. H. DICKERSON
Mining Engineer, Huntington, W. Va.

AIR SURVEYS are desirable to determine how air circuits may be improved to supply more air to the working sections or reduce the cost of ventilation. The moisture, dust and methane content of the air must be considered for a complete plan of ventilation, but this article will be confined to surveys in connection with air distribution in the main circuits. If a definite plan of ventilation has been followed, the surveys will be largely a check on leakage or increasing resistance in parts of the circuit. Increased leakage may be due to increased pressure, or to stoppings, doors and other parts of the system in need of repairs because of settlement, roof falls, wrecks, etc. Increased pressure may be due to longer airways, an increase in the air volume, an adjustment of regulators or to falls, water, heaving bottom, etc.

Pressure Gages Important

Pressure gages are especially important in air surveys. Some States require a recording gage near every mine fan. Where a large mine is ventilated by one outside fan, a recording water-gage is desirable at some convenient point not far from the main opening, preferably at an underground office or dispatcher's station. We may expect the mean daily pressure to increase gradually over an extended period, due to longer air circuits and further obstructions in airways, but the air volume is likely to be reduced by increased resistance. Pressure will be increased when the fan is speeded up or adjusted for a larger quantity of air. Temporary changes of pressure may be due to outside weather conditions, a short stoppage or slowing of the fan, a wreck, a main door being left open, an extensive fall in an airway, a pillar fall, etc. If reasons for frequent or material changes in pressure are not known they should be investigated.

Mine ventilation should be planned just as carefully as the methods of working and coal preparation. Where ventilation is left entirely to the mine foreman there is likely to be a continuous current or extremely long unbalanced splits, and an excessive number of doors, wide crosscuts, inefficient stoppings, etc. Seldom is this the fault of the mine foreman. It is his duty to get the air in the working faces rather than to go into the economics of mine ventilation. He usually is expected to keep his labor costs to a minimum. He hardly can undertake the cost of extensive repairs or improvements in the ventilation system unless the higher officials are interested, although the changes might soon repay their costs in reduced power bills, future labor charges, greater efficiency and safety.

With an air survey the sections having the worst leakage or resistance may be located quickly, and should have special attention. Having complete data, an improved plan may be made, along with an estimate of the savings and advantages which will result. A new opening, additional airways, a change of fans, cleaning up falls, drainage, reduced leakage, overcasts, balanced splits and other improvements may pay for themselves in a short time and continue to pay dividends for years.

Altimeters Find Use

In many mines in England, and in those of a few of the larger companies in this country, the pressure readings for air surveys are taken with an altimeter, or aneroid barometer. This method has been described in articles by J. N. Williamson in *Coal Age*, Vol. 37, pp. 297 and 331. The Paulin altimeters, made in Sweden, with delicate parts tempered in Egypt, were the only commercially available instruments considered sufficiently accurate for this work, and they must be used by an experienced operator under favorable conditions. Due to the war, these were off the market by 1941, although Paulin instruments made in the United States may be available.

In using an altimeter in a shaft mine it should be taken down several hours before it is to be used. A second instrument must be kept at a base point on the surface and read at regular intervals to determine atmospheric pressure changes. The operator in the mine travels an airway and records the altimeter readings at points of known elevation, putting down his reading, elevation and location of the point; the time of reading and the air volume. Corrections must be made for elevation and change in the outside barometer. Corrections also are made for temperature and velocity pressure.

Handling the Altimeter

The altimeter is very delicate and may be thrown out of adjustment easily. It should be kept in its case, as the warmth of the hand or the air velocity in contact with the small opening in the back will affect the readings. To get satisfactory results with the instrument, conditions must be favorable both outside and in the mine and the operator must use extreme care with the readings or the survey will have to be repeated. Because of the many difficulties in such surveys a simpler method is suggested, which will answer general purposes and greatly reduce the cost and the time required.

In mines of considerable size small pipes may be put through the stoppings along the main headings, at

intervals of about 1,200 ft., to which a water-gage may be attached for a pressure reading. A marked and measured station for measuring the air flow should be located close by in the entry. After the initial readings, if it is found that the pressure at a station near the fan has increased materially, the reason may be found quickly by checking the air volume and connecting a water-gage to these pipes, reading the pressure and then comparing the results with earlier readings after making allowances for changes in air volume.

Effect of Changes

If the quantity of air at the fan has been increased 5 percent, the pressure will be increased about 10 percent, minus the reduced, or plus the increased, resistance of the workings as changed since the former readings. If the pressure at the fan has been increased from 2 in. to 2.3 in. w.g., we may assume that about 0.2 in. is due to the 5 percent increase in air quantity and 0.1 in. to the advance in the workings or increased resistance somewhere. If a station ahead along the main airway formerly showed 1 in. w.g., we may expect the pressure due to the increased quantity of air and the newer workings to make it about 1 in. multiplied by 110 percent plus 0.1 in., or 1.2 in. w.g. If the actual reading is less than 1.2 in. w.g., it indicates increased resistance between the station and the fan. By quantity and pressure readings, changes in leakage or resistance may be located between two stations.

Before selecting a new fan or planning a new system of ventilation for an old mine, a map should be provided showing the location of fans, inlets and outlets, doors, overcasts, regulators, etc., the direction of air currents, and elevations for the coal bed and the surface. Points may then be selected for air and pressure readings in the mine. A water-gage with 100 ft. or more of rubber tubing is suggested for taking differential static pressure readings. The intake end of the tubing should be kept out of the main air current or provided with a metal fixture placed so that the air does not blow directly into the tube. A station may be selected near a door and the tubing laid from the station to a point nearly opposite in the adjoining airway carrying air in the opposite direction. Distances between air stations may be measured in the mine or scaled from the map.

A good anemometer should be provided for determining the quantity of air per minute passing a station. It is assumed here that the operator knows how to take sufficiently accurate readings, but readings taken in airways generally are too high, frequently from 10 to 30 percent. Where the velocity pressure is desired it may be calculated from the average velocity (V) in feet per minute by dividing V by 4,000 and squaring the result to get inches of water gage.

Besides noting the quantity of air and static pressure difference at a station, together with its location and cross-section, the following information should be noted between stations: condition of entries as to track, partings, moisture, gob on sides, the amount and kind of timbering and how set with reference to ribs, a description of falls, the alignment and smoothness of ribs, top, etc., also the kind and condition of stoppings, doors, overcasts, etc., and where located. In the working sections note the use of curtains, line brattices, portable fans and tubing, etc., and general conditions. Where regulators are found note size of opening in a stopping and both areas for the door type.

Discrepancies from readings at the fan or station in the mine may be due to doors being open and the air not following the circuits intended at the time of the readings. Readings at the fan should be taken when it is known that all doors normally closed are in that position. At points in the mine where readings are not consistent, due to open doors or other causes, they should be checked. Inside mine-fan circuits should be checked for recirculation. Note information about air-shaft or drift lining and check for leakage to the surface. Note if the air shaft is wet, its shape, size and how it is connected to the fan and to the entries below to reduce the resistance of turns, etc. Check surface breaks and other openings to the outside, also leakage around fans and their connections, and make general observations about the mine air.

Analysis by Readings

To get a quick analysis of the general condition of the air circuits in a mine, air readings may be taken as indicated at Stations *A*, *B*, *C* and *D* in Fig. 1. From these data the basic resistance may be determined for a given volume of air per linear foot of distance between stations, 1 ft. of distance to include the adjoining intake and return airways. Calculations are made by a method similar to that used for other problems relating to leakage and pressure.

The basic resistance per linear foot as shown in Fig. 1 for 60,000 c.f.m. is for the sum of the intake and adjoining return airways between stations for 1 ft. The airways for air in one direction may have a fairly uniform basic resistance from *A* to *D*, while there may be a considerable difference in the resistance for the air in the opposite direction, and be-

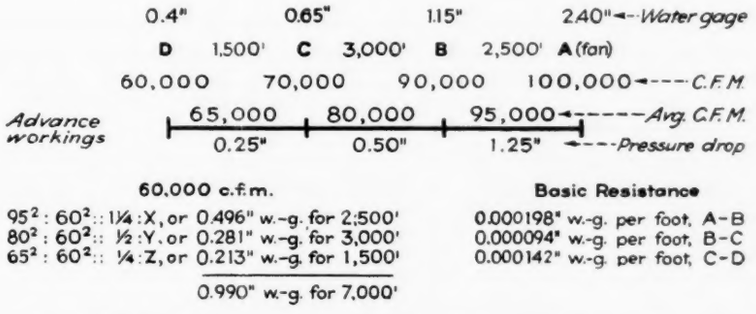


Fig. 1—Location of readings and calculation of resistance in an air survey.

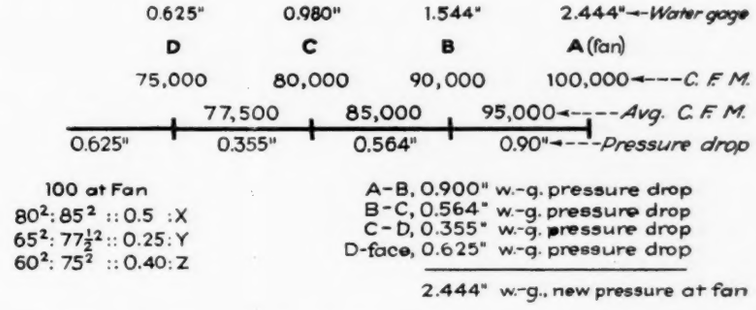


Fig. 2—Method of calculating the results of changes in ventilating methods.

tween stations *D*-*C*, *C*-*B* and *B*-*A*. Where there is an unusual resistance between two stations both the intake and return airways should be investigated, although most of the trouble may be found in the intake or return.

It will be noted that the basic resistance in Section *A*-*B* is more than double that in *B*-*C*. This indicates that there are fewer or smaller airways in *A*-*B*, that they are rough and crooked or partly blocked by falls, etc., and calls for further investigation. It is nearly a half mile between *A* and *B*, and it probably will save time to put in one or two intermediate stations to find the sections having the highest resistance unless traveling the airways shows falls or something to explain a considerable part of the extra resistance between stations. Basic resistance between *B* and *C* is low, so these entries are in better than average condition except for leakage, which should be checked further and reduced. From *C* to *D* leakage still is high, and the basic resistance is higher than from *B* to *C*. The latter may be due in part to haulage or standing trips between *C* and *D*. The entry might be widened, or an extra entry provided where trips stand.

Calculating Changes

The problem in Fig. 2 will indicate the method of calculating the result of changes. If leakage is reduced from *B* to *D* so that there is 80,000 c.f.m. at *C* and 75,000 c.f.m. at *D*, and resistance is decreased to 0.9 in. w.g. for the 90,000 c.f.m. delivered at *B*, what pressure will be required for the 100,000 c.f.m. at the fan, with 75,000 c.f.m. at *D*? Air quantities are divided by 1,000.

In this case some reduction in resistance between *A* and *B*, and partial reduction of leakage between *B* and *D* provides 25 percent more air in the working sections ahead of *D* with about 2 percent more power. Further reduction in leakage and resistance might be made to reduce the power required, but to get 25 percent more air at *D* by increasing the air at the fan would raise the pressure 56 percent and require 95 percent more power.

For checking an airway for resistance due to falls, water, etc., tubing may be used between points several hundred feet apart in the same entry and the water-gage read for the difference in pressure from some point in the line of tubing between the two ends. This is especially useful for determining the pressure drop across a fall, overcasts, etc., or the distance between stations may be divided into short sections along one airway for intermediate readings. The total of the pressure drops for these sections represents the pressure drop for the intake or return airways between stations, depending on whether the readings were in the intake or return.

Determining Pressure Drops

The pressure drop shown by the difference in static pressure between the intake and return airways at two stations may be considered generally as the total static pressure drop along the intake and return airways. The total pressure drop really is the difference between total pressure at the various points, rather than the difference in static pressure, as read with the water-gage and rubber tubing, but the difference in velocity pressure usually is negligible, except where one point is near the fan or in a restricted airway. At such places the average velocity may be determined at the two points and converted to velocity pressure in water-gage.

For checking between two stations within a distance of about half a mile, in an intake or return airway, an aneroid might be used to advantage if a sufficiently accurate instrument were available and elevation points had been established, as it will not take long to take the readings, and they can be checked by the water-gage readings between the intake and return airways after running both the intake and return airways separately and making the necessary corrections for difference in elevations and velocity pressure. If an aneroid is used to get the difference between intake and return airways, the operator may have to wait fifteen minutes or more to allow the instrument to adjust itself for pressure and temperature changes. He should then correct his reading for elevation and velocity pressure. If elevations are higher than the starting point, the difference of elevation in feet should be subtracted from the reading at the higher point, and if lower they should be added. With corrections for elevation between the starting point and a point ahead, to put them on the same level, the indicated difference in feet, due to the difference in static pressure between the points, represents the difference in height that would give this difference in pressure.

TABLE I — CONSTANTS FOR CONVERTING DIFFERENCES IN STATIC PRESSURE TO INCHES OF WATER-GAGE

Elevation	Constant*
0– 500	0.0154
500–1,000	0.0152
1,000–1,500	0.0150
1,500–2,000	0.0147
2,000–2,500	0.0144
2,500–3,000	0.0141
3,000–3,500	0.0138
3,500–4,000	0.0136
4,000–4,500	0.0133

* Equals corresponding water-gage, approximately, for 1 ft. of elevation indicated by aneroid but due to mine pressure.

TABLE II — WATER-GAGE AND VELOCITY-PRESSURE EQUIVALENTS

Water Gage, Inches	Velocity, Feet per Minute	Water Gage, Inches	Velocity, Feet per Minute
1/8	1,000	1½	4,900
¼	1,414	2	5,656
¼	2,000	2½	6,324
⅜	2,450	3	6,928
½	2,828	3½	7,484
¾	3,464	4	8,000
1	4,000	4½	8,485
1¼	4,472	5	8,944
		6	9,800

Using the Aneroid

The aneroid should be set close to the elevation of the starting point above sea level, as the difference in pressure is not uniform per foot at different elevations. To convert the indicated difference in static pressure in feet to inches water-gage multiply the indicated difference in feet by the constant in Table I. If the base point is 1,250 ft. above sea level, with the aneroid set for that elevation, and another point at the same level shows 1,300 ft., the difference in static pressure will be about 50 x 0.015, or 0.75 in. water-gage, if it is not necessary to make corrections for atmospheric changes or temperature.

Table II gives the approximate water-gage for velocity pressure, dry air at sea level and a temperature 70 deg. F. Mines are mostly above this level, and temperature and moisture vary, but the table will answer for most purposes except for determining air quantities and accurate tests for fans. Near the fan it will be necessary to add the velocity and static pressure algebraically for total pressure. With a blower fan, the total pressure will be the sum of the static and velocity pressures. With an exhaust fan the static pressure is negative, and the total pressure will be the difference between the static and velocity pressures.

Pressure readings should be taken at least 50 ft. from a fan, ordinarily, to avoid turbulence. A small pipe may be put in the airway with a tee having its openings at right angles to the air current to bring air to the water-gage for static pressure. Average velocity at location of the tee may be used for determining velocity pressure from Table II or the formula.

DEEPWELL UNIT
Takes Over From Six Other Pumps

New Deepwell Turbine Pump Handles Water From Two Seams—Draws 38 Hp. Compared With Installed Horsepower of 285 for Six Others Displaced — Mile of 4-In. Pipeline Also Taken Out of Mine Service

ONE DEEPWELL turbine pump rated at 350 g.p.m. and drawing 38 hp. displaced six underground mine pumps with motors totaling 285 hp. in Mines Nos. 2 and 15 of the Pursglove Coal Mining Co., Pursglove, W. Va. That is only part of the picture. A mile of 4-in. pipeline also was displaced. The savings in maintenance, attendance labor and power will return the investment several times during the years the new pump will remain in use at its present location. Outdoor mounting of the pump and an automatic electric valve on the lubricator are features of the installation.

Hole depth is 310 ft. and it bottoms in the No. 15 mine, in the Pittsburgh seam. The pump, however, drains territory in two seams, the other being the Sewickley (No. 2 mine workings), 9 ft. above. Boreholes drain from that down to the Pittsburgh.

The bowl assembly of the pump, made by A. D. Cooke, Inc., is of chrome alloy, including 10 ft. of the drive shaft. As further protection against acid the first, or lowest, joint of the 6-in. column pipe is rubber-lined and rubber-covered. The remainder of the column is coated on the inside with bitumen enamel. Size of the borehole casing is 10-in. The 40-hp. motor is a Westinghouse 440-volt Type CS unit rated at 1,750 r.p.m.

Magnetic Valve Helps

To prevent lubricant waste and at the same time eliminate any possibility of operating the pump without first opening the valve to the sight-feed drip of the glass-reservoir lubricator, the latter is equipped with a magnetic valve which opens at starting and closes when the pump is stopped. To avoid tampering with the lubricator, or accidental breakage, it is housed in a box with hinged and padlocked cover, all made from a short length of 6-in. pipe. This box with welded hinges can be seen in the accompanying illustrations at the left of the motor.

A pole with double crossarms for dead-ending the primary feed line is utilized as one side of an H-frame with steel crossbar carrying a sheave for handling the pump. Also attached to it is the starter with the weatherproof box and in addition this pole is one support of a platform carrying the two 25-kva. Pittsburgh transformers supplying the 440-volt power.

The pump is started and stopped by a mechanic who comes from the central shop 1 mile away. Under normal conditions he starts it at 4:30 p.m. and stops it at 7 a.m. The mine sump holds approximately 800,000 gal., equal to at least 36 hours of continuous pumping.

Motor and control are weatherproof and therefore require no housing. Three poles serve as derrick frame, deadend and transformer support.

THE FOREMEN'S FORUM

Why Mine Roof Does Not Bend or Break Down Near Edges of Supporting Coal Pillars

ANY BEAM, whether a timber, a girder or the mine roof, will sag a little at the center of the space between the supports on which its two ends are resting. If its ends merely rest loosely on their supports, as is often the case with timbers and girders, the beam will not only be nearly level at the center, as will also all evenly loaded beams with two supports at the same level, but the beam will slope upward more and more as the support is approached.

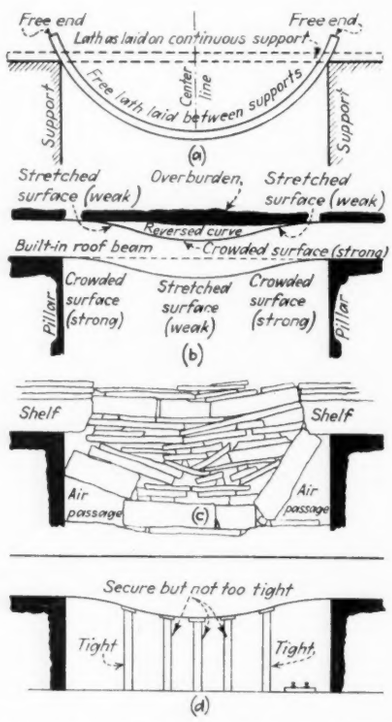
What Happens With a Lath—To illustrate what happens, let us suppose that only a light lath, barely able to support its own weight, such as is shown at (a), is used in place of a strong timber. Then this upslope will be quite evident, and the lath will sag so much that its ends will be noticed drawing toward the center to compensate for the greater length required to span the opening because of the curved shape the lath has assumed. The same effect will occur with a timber or steel beam and with the mine roof, but will not be as apparent to the eye as it is when a lath is used.

Free Beams—Though the mine roof, as stated, sags at the center of the space between the supports, it does not bend in the same manner as the lath, timber or girder already described because its ends are not free to tilt upward or to move sidewise on the top of the support or pillar, for the weight of the roof resting on the roof beam ends holds them down securely to the top of the coal bed. For this reason, the curve of the roof beam is different from that of the lath, timber and girder, which are known as "free beams" because their ends are free.

Fixed or Built-In Beams—The mine roof is not a free beam. Those who study "strength of materials" term it a "fixed, built-in or encastre beam." Of course, the roof beam is not actually built in by masons or carpenters, but nature has buried it by tons and tons of covering material, so that it acts much as if it actually were built in. The lath, timber or girder could have been built in also, and it often is, and then it will act much like the mine roof, with this difference, that usually the mine roof extends in all directions and covers acres and acres, and this adds to the strength and somewhat modifies the effect, because of the way in which the distant measures pull on the rock over the undermined area.

Built-In Beams Cannot Sag Like Free Beams—For the roof to sag down in the same manner as the free lath, timber and girder sagged—namely, with their ends at the pillar edge descending at maximum pitch—it would have to break away entirely from that other part of the roof that is resting quietly on the pillar and is held down solidly by the weight of the roof measures that lie between coal and surface. For that to happen, the rock would have to snap and drag itself loose. Thus broken at the pillar's edge, it would fall.

Beam May Change Later From Fixed to Continuous Beam—When the distance between supports increases considerably, even the upper or main roof will begin to bend, and it will belly down between pillars and arch or tend to arch up over the pillars as any other continuous beam would do, and when that occurs it will compel the lower roof or drawrock to do the same. In fact, the drawrock, being more flexible, will try to lop down between pillars and arch up over the tops of pillars somewhat more markedly than the main roof. It will no longer be a fixed beam.



Illustrating the bending of the rock over an opening.

Stretching and Crowding—If one takes a thin piece of wood or metal and bends it over the edge of a table, the upper edge is stretched, or "put in tension," and may break and the under edge is crowded together, or is "put in compression," and will not be injured. The rock roof near the pillar similarly is crowded, or compressed, on its under surface and is not likely to fail or fall because rock can withstand more crowding than stretching—more tension, that is, than compression.

Arches and Bellies

Curvature Reverses—Farther out from the pillar, the roof beam is bent the other way, and there it is quite likely to break and fall, for the stretch is on the lower surface. Fortunately, at the face, the rock is bending down and is crowded or compressed and so tends to stay up if the roof is at all strong. That is why at some mines it is possible to operate large space taking machines at the face without props or cribbing. This "working lane" in front of the face is not wide, especially where the roof is weak. When the face has traveled forward, however, in the process of mining, that same piece of rock will be bending the other way, and it will be stretched on the lower side and will be more likely to break.

Shelf of Rock Outlasts Heavy Caves—Of course, the rock may be such a rotten piece of drawslate that even where it is compressed it will fall. One cannot argue about roof of that kind. It will fall almost as soon as there is no coal under it. With roof of any strength, a sort of shelf (c) usually is found against the coal pillar. This is not broken even by heavy roof falls, and it usually holds back the slabs of broken rock so much that one may be able to crawl under it or at least one can see under it for some distance, and air will travel along the low and narrow passageway thus left open.

Crowding Stress Favors Roof Near Rib—Because the roof near the rib or pillar is subjected to a crowding stress and not a stretching stress, it is not so dangerous as the rock in the middle of the room. Consequently more supports, not more rigid supports (they are different), should be provided near the center line of the room.

and the roadway preferably should be placed near the rib to take advantage of the crowding stress and the greater strength of the rock under crowding. Especially is this important where cars have to be loaded.

Tighten Props Near Rib—Moreover, props set near the center of room should either be driven only so tight that they will not be upset by shots or they should have softer cap pieces than side posts, as the roof will sag more in the center than at the sides, for there the roof will be able to descend in a measurable degree and crush the post excessively. By driving the center posts too vigorously, they may be made so tight that when the roof settles they will break, and when that happens, other posts will have to undertake to hold up the weight and these may be broken also. Near the rib there is less risk of broken posts, no matter how tight the posts are driven when placed. Driven tight, these side posts will help to support the roof in the center, for they will reduce the span of the opening.

Even creviced rock may heal when the rock is crowded and under compression, but stretching rock will not only enlarge its crevices but make new ones where there were none before.

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Difficulties in Air-Conditioning Against Mine Explosions

Fortunately, the bituminous mines of the United States, being usually nearly level, have an even temperature throughout except where the surface air near the mine portal or shaft raises or lowers that temperature. In consequence, if the air before being admitted to the mine is warmed or cooled to mine temperature and humidified to saturation at that temperature, it will remain saturated or nearly saturated as long as it remains in the mine.

If, on entering the mine, the conditioned air has to go down a shaft or short slope, the walls of that passage will become heated to the mine temperature, and no moisture will be removed from the air as it passes through the workings. But in mines with long slopes, several working beds and heavy pitches, the temperatures below ground inevitably will vary, and the heat of the workings will render the air unsaturated; in consequence, the moisture of the mine will be evaporated.

That is what happens in European mines and perhaps is one reason why explosions and mine fires are frequent despite both well saturated surface air and the utmost precautions. It is doubtful, however, if the miners, working in the high temperatures of the deeper workings, would want the air to be saturated, for men working at such temperatures need unsaturated air that will stimulate perspiration and so cool their bodies. In the anthracite region, European air conditions are duplicated, but the material mined, being inexplosive, the use of saturated air would not increase safety from explosions though it might reduce the frequency of mine fires.

On the other hand, some mines in the West might be bettered by any addition of moisture, even though perfect saturation would be in no instance maintained. Some of these mines with coal having a high moisture content provide much of their own water vapor, and if the air was saturated on entering, it might be expected to retain that saturation throughout the mine. However, not all western mines have the necessary surface water for air-conditioning though they might obtain it from the return air. Some have tried air-conditioning, especially in cold weather, but in no case was the work done with the precision that would preserve the mine from injury.

A careful study of these possibilities would be necessary, for in some mines salts might be formed with moisture at less than air saturation, and such salts might disintegrate the mine roof, for many western mines have never experienced the presence of water.

Never Knock Out a Tight Post, for You And It Will Fall Together

IN KNOCKING OUT a prop, the more you try to keep at a safe distance from it, the more you must lean forward and overbalance to reach it with your sledge and the more certain you are then to roll over when you knock it down, and the more surely will you fall under any loose rock that may have been resting or partly resting upon it. To stand up close and jump back when the post falls probably would be just as safe and just as dangerous as to stand at arms-plus-sledge-length distance in striking at the post, for if you stand close you are able to jump and may be able to get clear, but if you are lying on your side with your arms above your head you will be fortunate indeed if you can roll out of the way of falling rock.

Dislodging props with a sledge always is dangerous. If the sledger keeps at arm's length he is sure to lose his balance and fall under the rock.

News from North Africa illustrates this. Leonard Aronson writes his mother: "He [a German] swung his rifle butt at me horizontally. . . . Unfortunately for him, he lunged with such fury it swung him around and left him wide open for whatever I wanted to give him. I didn't have to tell my hands what to do." The miner who lunges at a post horizontally likewise is swung around by his sledge and is wide open for what ever the falling rock wants to give him and it frequently "is aplenty." Like the German, he doesn't have time to jump.

In any event, knocking out a loaded post with a sledge is a sure way to the bone yard. The effect of the sledge in unbalancing the body would be immediately apparent if you were to miss the prop altogether. You probably would fall flat with damaging injury to yourself. You depend on the prop to make enough resistance to prevent you from falling, which it will not do if the prop is dislodged. An exhibition at a safety meeting of the near and far way of knocking down a post and the unfortunate relation of the body to the hazard in each case would convince anyone of the danger involved whenever a prop is loosened by a sledge or ax. Always use a prop-pulling device in withdrawing a prop.

Some advocate using a long post as a battering ram. But here again the risk of overbalancing is too obvious for comfort. Post pulling is so dangerous that in the anthracite region it is forbidden by law. However, safety and conservation both demand that props be pulled in order to prevent the crushing of coal and overweighting of live workings with possible loss of coal and danger to life and limb. Consequently, every appliance that will protect the post puller should be provided and, at the risk of some inconvenience, should be used by him.

STATE-BOARD QUESTIONS

Quiz Presented Applicants for Certificates As Mine Foremen in State of Alabama*

Regulators

Q—(a) Can a mine be ventilated without doors? Explain fully. (b) What is the purpose of a regulator? (c) Where should mine regulators be placed?

A.—(a) A mine can be ventilated without doors when splits, overcasts and regulators have been provided. Wherever a side heading leaves the main intake heading, as at A in the illustration, the air may be split. What this procedure involves depends on which side of the main intake heading the main return heading is located.

1. *Side entry, on opposite side from main return heading:* The air is "split" or divided by the sharp angle between two headings which cuts the air current in two as a knife "splits" a stick (see illustration). Part of the intake air goes along steadily in the main intake heading and another part, usually a smaller part, of the intake air goes into the side heading up to its end, *B*, travels through a crosscut to the side return heading and returns by that heading to the main intake heading, where a tight overcast, or "air bridge," C, is provided that carries it in a tight conduit over the top of that heading to an extension of the side return heading, which, in turn, carries it to the back heading of the main entry at *D*, where it meets the main return air and goes on with that air to the fan. The intake air is almost at atmospheric pressure; the return air is at a lower pressure, and it is this drop from one to the other that causes the air to travel up the side haulageway, over to, and along the side return heading, over the overcast and back to the return of the main heading. Other headings on the same side similarly can be ventilated.

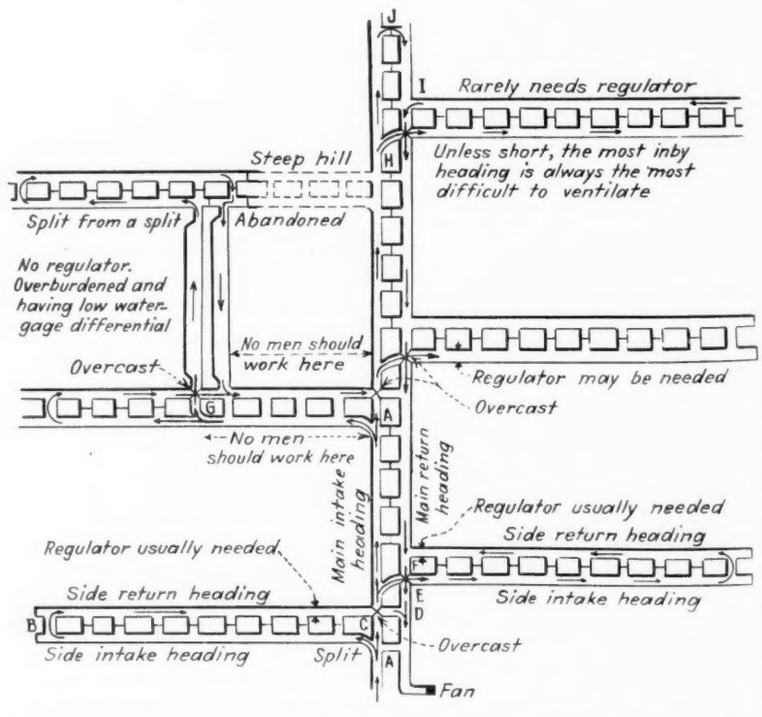
2. *Side entry on same side as main return heading:* The air going to the side intake heading on the same side as the main return airway passes under the return air in that main return at *E*, because another overcast, or air bridge, is provided to carry that return air over the split of air traveling in the side intake heading. This split goes to the end of the side intake heading and then travels through the last crosscut back to the side return heading, along that heading and back to the main return heading, where it joins with the main return air at *F* and with the return air from the other side headings and all of them together go to the fan. Other headings on the same side similarly can be ventilated.

Thus all the splits find differences of pressure to compel the air in the side headings to make the trip from and back to the main entry, and air taken from the inlet does not meet the main current until they meet one another as return air currents and have finished with their ventilating task.

When a split has been taken off the main air current, the latter current becomes itself a "split," sometimes a smaller split than the other current, especially far inby, but nevertheless it is not so regarded by inspectors, nor should it be, unless men are receiving air from it directly. Usually near the end of a main current men are working in places traversed by the main current or in places opening on the main current, and only then do inspectors regard the main current as a "split."

Inspectors do not regard a split from a heading into a room or a row of rooms as constituting in itself a "split" when the air returns to that same split, nor is a portion of the current taken off by an auxiliary fan regarded as a "split," though actually it is nothing else. Inspectors regard such splits as parts of larger splits.

The law designates the number of men allowed on a single "split," and no more may be directly or indirectly on any split between the first man and the last man on that split, both being included, but any return current may carry air from any number of men, no matter how many, so long as no more men will be passed or fed with the air on the return run from the last man. Thus a split can be taken from a split, as at G in illustration, prior to a point on that split where the first man receives air, and both splits may have separately even the full number allowed by law, but when the returns from both splits are conjoined, no men can be allowed to work in that return current, for then it would have passed more men than the law allows.



Map of mine with rooms omitted and headings drawn excessively wide so as to permit arrows designating air currents to be placed in appropriate positions.

* Continued from March, 1943, *Coal Age*, p. 74.

(b) A regulator is an air-rationing device; it is a means of increasing the resistance of a split of air and so reducing its volume that, in consequence, another split which needs more air will receive it. This should be done when the men on the second split need more ventilation than they are getting. The regulator may be a swing door that is left partly open or a sliding door, either of which can be opened or closed in part so that the relative needs of the various splits can be satisfied if sufficient air, when properly distributed, is available to satisfy all the men on every split.

(c) Regulators should be placed in the least resistant splits in the mine or in the splits with the greatest difference of pressure between terminals or in those serving the fewest men, so that they will not take the air from the more resistant splits or from the splits with lower pressure differences and from those supplying the larger number of men. Short splits and those near the mine opening are greedy for air and if not checked will rob all the rest.

In practice, the foreman or the inspector counts the number of men to a split and calculates from the mining law how many cubic feet per man must be supplied and thus determines how much each split should receive. Then, regulators are put on all the splits except those that obviously do not need them, because they have so many men or because they are so long and sluggish already. Then the short splits with the fewer men are regulated by adjusting the regulators to keep the ventilation down to the need of these splits and, after some juggling, a way is found to satisfy the requirement of each split, unless it is found that the air required is inadequate to supply all the men in the mine. Then the fan has to be speeded or a new fan installed or headings are cleaned of rock or the rock broken down smoothly or water is drained away. It is well to be able to regulate the air and to clean away the rock in any event, though to remove rock and then find that the airway is so clear that regulation is necessary to prevent the airway taking too much air is a waste of labor. The work or part of it in that case has been lavished on the wrong split.

It is often not realized that though, at the first crosscut, the difference of pressure is considerable between intake and return—that is, between *A* and *D* in the illustration—at the last crosscut it is almost zero. The movement of air in a split is provided by that difference of pressure, so the splits circulating in inby entries have only a meager pressure difference as between *H* and *I* on which to work, and it becomes increasingly difficult to get air to travel them in quantity. It may become necessary to put a regulator in the crosscut between the main intake heading and the return main heading. However, where the main entry is extended well beyond the side entries, the resistance of the air to traveling along the extension and back again, as from *H* to *J* and from *J* to *I*, gives a regulating resistance that provides some, at least, of the needed difference in pressure between main intake and main return headings.

Questions Anthracite Inspector Candidates Were Asked Sept. 2, 1942*

Horsepower for Air

Q.—If a fan is delivering 100,000 cu.ft. of air per minute at 2-in. water gage, what is the actual horsepower output?

A.—Two inches of water gage is equal to 2 x 5.2 lb. = 10.4 lb. per square foot pressure. This is imposed on 100,000 cu.ft. of air. For this reason, the work done on the air is 100,000 x 10.4 = 1,040,000 ft.-lb. As James Watt arbitrarily made 33,000 ft.-lb. equivalent to 1 hp., the horsepower on the air is 1,040,000 ÷ 33,000 = 31.5 hp.

What the actual horsepower is when allowance is made for efficiency of motor, fan drive and fan is anybody's guess, because of the variance in the inherent efficiency of such units, their condition and the nearness of the operating demands to the point of maximum efficiency of the equipment. A fair figure for efficiency might be 70 percent. This granted, 100 hp. at the prime mover will impose only 70 hp. on the air and 1.4 hp. will develop 1 hp., so perhaps 1.4x31.5 would be a good figure and that is equal to 44 hp.

Q.—(a) If you have a fan producing 100,000 cu. ft. of air per minute at 2.5-in. water gage, what will be the horsepower and water gage if, by increasing the speed of the fan, the volume of the air is increased to 150,000 cu. ft., conditions in the mine remaining the same.

(b) If the speed of the fan in question (a) is 100 r.p.m., at what speed must the fan run to deliver the volume of air desired?

A.—The quantity of air is increased 1.5 times, therefore the power requirement will be increased by 1.5^3 times; that is 3.375 times. Pressure = 2.5 in. x 5.2 lb. = 13.0 lb. square foot. Power requirement originally was 13x100,000 = 1,300,000 ft. lb. It now will be 1,300,000x3.375 = 4,387,500 ft.-lb. Dividing by 33,000 (the number of foot-pounds to the horsepower), the horsepower will be about 132.95.

Water gage, or pressure, will be proportional to the square of the increased volume of air or 2.5 in. x 1.5^2 = 2.5 x 2.25 = 5.625 in.

Which Way Will Air Go?

Q.—If a slope opening of a mine is at an elevation of plus 800 ft. and a shaft opening has an elevation of plus 1.050 ft., with no artificial means of producing ventilation, (1) How would the air travel in winter? (2) How would the air travel in summer? (3) How would the air travel if the temperature outside and the temperature of the mine were the same?

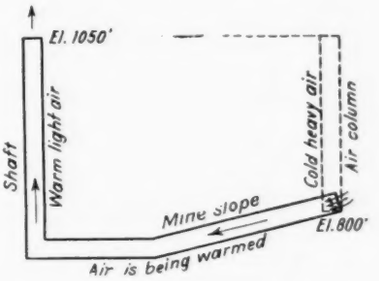
A.—(1) In winter, the air on the inside of the mine will be lighter than the air on the outside and will use the shaft as a chimney, and the heavy air will roll in through the slope (see sketch).

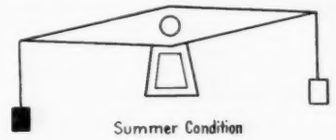
(2) In summer, the mine air will be heavier than the outside air and will leave at the slope, and the surface air will enter through the shaft.

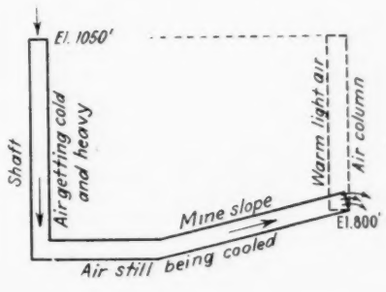
(3) When both inside and outside air are at the same temperature, there will be no movement except that the mine air will be a little the lighter by reason of the methane and perhaps the blackdamp also, for blackdamp in a working mine usually is just a little lighter than air, for it contains an excess of nitrogen and a lack of oxygen with not enough carbon dioxide to make the blackdamp as heavy as air.

Probably the same applies to an *idle* mine also. When a man is asphyxiated in an abandoned mine, it usually is ascribed to carbon dioxide, but nitrogen more probably is the cause.

Because of the presence of methane and the loss of oxygen, the air in the mine probably will tend to leave the mine by the air shaft provided falling water does not make it travel the other way, regardless of the fact that the temperatures inside and outside the mine are the same.

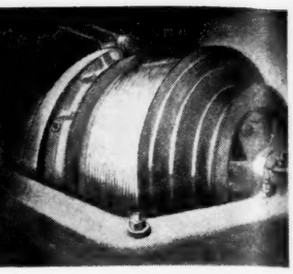






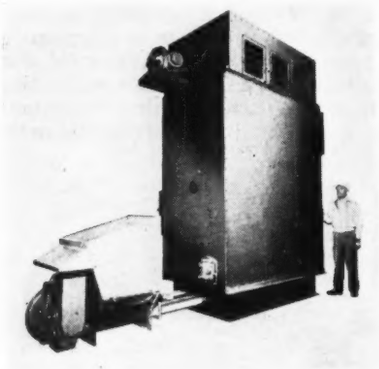
* Continued from March, 1943, *Coal Age*, p. 75.

TIPS FROM MANUFACTURERS



Coal-Fired Unit Heaters

Dravo Corp., Pittsburgh, Pa., offers a direct-fired coal-burning heater equipped with an underfeed stoker of either bituminous or anthracite type and either hopper or bin feed; also available for hand firing with undergrate fan. Made in eight sizes, from 1,000,000 to 4,000,000 B.t.u. output per hour, the unit is entirely self-contained, having its own combustion chamber and distributing warm air either directly from outlet vents into the area to be heated or, when partitions or ob-



structions make it necessary, through a simple duct system.

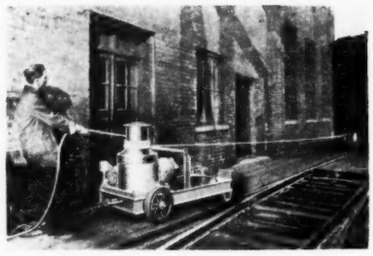
Corrugated combustion chamber with its fins and deflectors makes possible heat transfer to a moving air stream about the same rate per square foot of surface as is obtained in the boiler and transmission of heat from combustion chamber to water. There is plenty of furnace volume for the fuel to burn completely without smoke before the gases strike coal surfaces. Tightly welded combustion chamber prevents infiltration of excess air.

•

Portable Car Spotter

Link-Belt Co., Chicago, announces that its line of motorized electric car spotters, heretofore furnished only for stationary mounting, is now available also in portable form. The unit is said to be so balanced on a channel-iron frame that one man can lift the one end and roll the unit to any desired location.

Operator need only anchor the frame with a chain; plug electric cord into nearest power outlet; hook one end of haulage cable to car or object to be moved; wrap the other end around capstan; turn on the motor, and feed away the cable while



the machine does the actual pulling.

Leaflet No. 1954 contains the over-all dimensions of portable machine; information on electric car spotters for permanent mounting is given in folder No. 1592-A.

•

Air Filter for Respirator

American Optical Co., Southbridge, Mass., offers a new air-filtering cartridge for its R-1000 respirator. The new Type AD unit protects lungs against a combination of all types of dusts, including toxic, pneumoconiosis-producing and nuisance dusts.

The face-piece of the AO R-1000 respirator contains a compartment into which a cartridge can be inserted, seven of which have now been designed for interchangeable protection against common respiratory hazards faced by industrial workers.

Previous cartridges include those providing protection as follows:

Type A—for Type A dusts in mining, quarrying, tunneling—quartz, sand, asbestos, coal, marble—in general, metal processing.

CC1—for low concentrations of light organic fumes, vapors and gases in paint spraying, degreasing, dry cleaning, cementing, etc.

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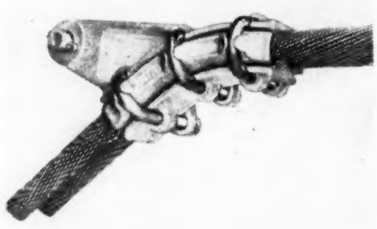
Multiple Strain Connectors

Delta-Star Electric Co., Chicago, offers a cable strain connector to meet the need for this type of equipment on projects where multiple cables are being substituted



for copper tubing or rolled sections in an effort to conserve copper. Fittings are available for multiples of two or four cables in all cable sizes up to 1,000,000 cm. Multiple cable fittings are listed in Publication No. 4211.

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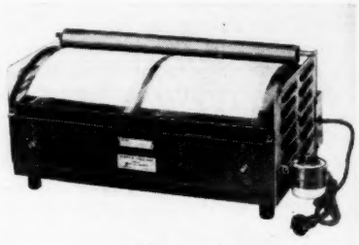
Makes Prints Speedily

A fast, practical, low-cost printer for making blueprints or black and white prints has been developed by Peck & Harvey, Chicago. Known as the Spee-Dee,



it makes either blueprints or black and white prints in half a minute, it is stated. A table model, it can be plugged into any standard electric outlet and is extremely easy to operate. It comes in two sizes: for prints up to 12x18 and 18x24.

•

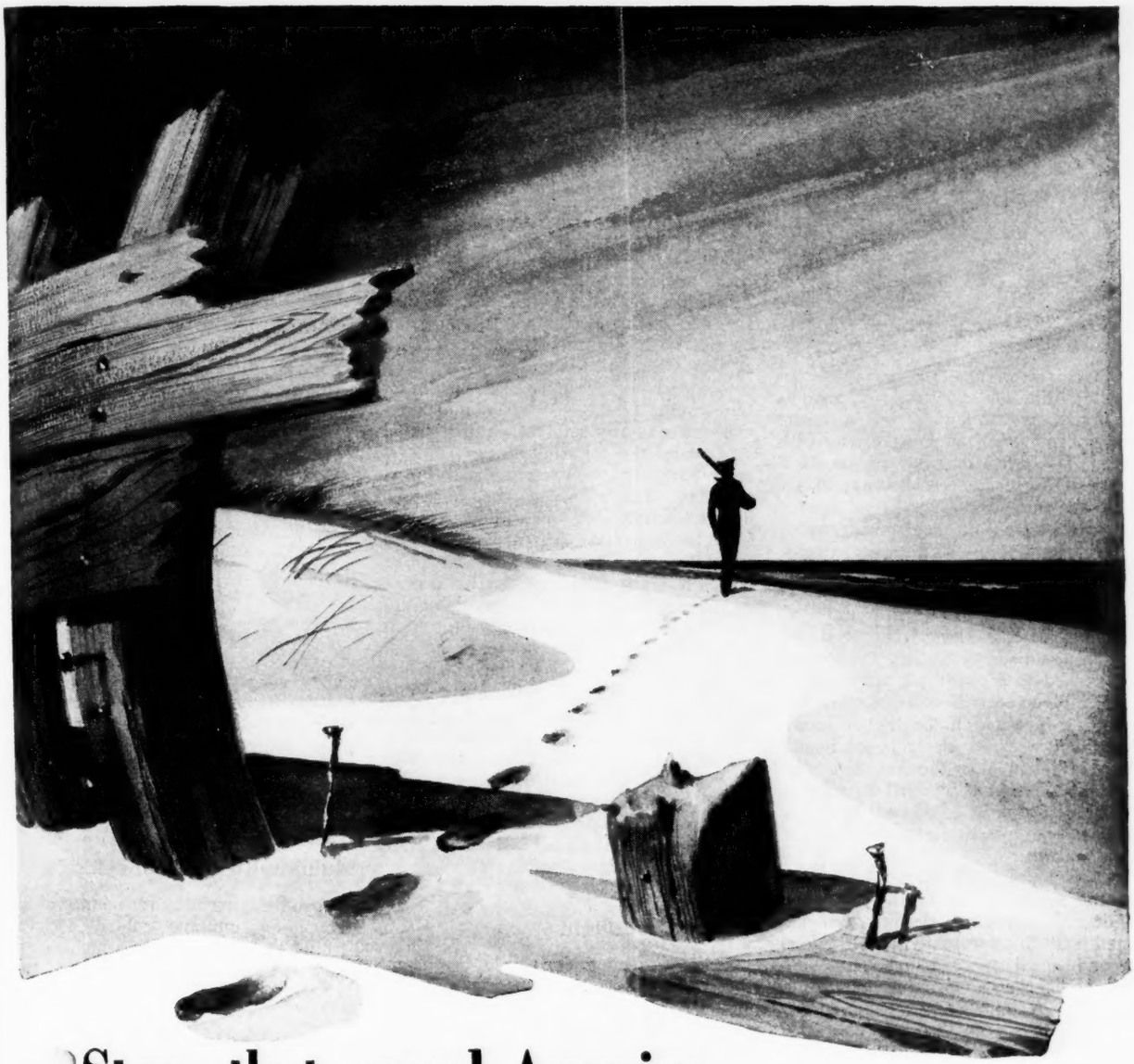
Welding Electrode

A new all-position a.c. electrode for electric welding, known as Murex Type A, has been developed by the Metal & Thermit Corp., New York City. With this new unit, overhead and vertical welds can be made without the use of a highly specialized welding technique, according to the manufacturer. Type A is available in $\frac{3}{32}$-, $\frac{1}{8}$-, $\frac{5}{32}$- and $\frac{3}{16}$-in. sizes. Typical physical properties of the weld metal, as welded, include yield points of 52,000 to 61,000 lb. per square inch, ultimate strength of 62,000 to 71,000 lb. per square inch, and an elongation of 22 to 26 per cent in 2 in.

•

Coal Cleaner

Developed during the last year by an experienced operator in the anthracite field to meet his own requirements for an efficient and economical method of cleaning buckwheat, rice and barley, the Val minerals separator is now being manufactured by the Vulcan Iron Works, Wilkes-Barre, Pa. Patent rights are held



Steps that guard America

He walks alone. His footsteps, plodding down some unnamed, silent beach, are a trail of protection between you and our Axis enemies.

Within the nation itself, there's a guardian's job we all can share. By caring for our tools and equipment, we make them last longer . . . and so save vital metals, and time, for greater war production. Storage batteries, for instance, last longer when you follow four simple rules of conservation. Obey them and you hit the Axis. Buy to Last and Save to Win!

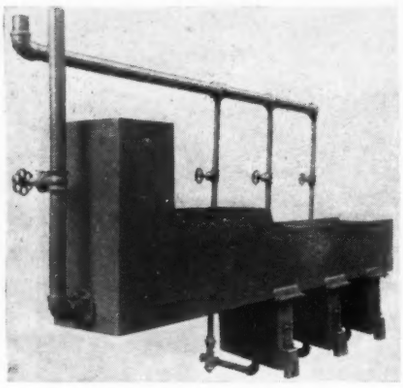
Exide
IRONCLAD
BATTERIES

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
Exide Batteries of Canada, Limited, Toronto

STEPS THAT GUARD BATTERIES!

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.



by Peter Minichello, owner, Morgan colliery, Old Forge, Pa., where the Val separator was developed and where the first Vulcan-fabricated Model A unit has been in operation six months. Because of its simple construction, low cost, low operating and maintenance expense, high capacity and compact dimensions the separator, it is stated, is adapted for quick, easy installation in existing preparation plants.

Although its preliminary process of stratifying material through agitation by water in a launder, or trough, has already been applied to a greater or lesser extent in other types of coal cleaners, the Val separator is declared to be the only one in which the heavier elements are finally trapped through their descent into discharge pockets being installed to remove as much of the bone as desired. It also is stated to be practical for bituminous cleaning plants.

The outstanding advantage of the Val separator is said to lie in the fact that any desired degree of cleaning can be secured with high capacity for the low cost and small space requirements involved. Under average operating conditions, one Model A unit, costing only a few hundred dollars, can handle about 15 tons per hour of any sized feed up to and including No. 1 buckwheat. The sponsors of the new cleaner contend that one man can easily operate all the units required in any anthracite or bituminous plant.

Tests by independent engineers under normal operating conditions at Morgan colliery, where the feed is described as coming from six different sources, some being difficult to clean, are stated to show the results indicated in the tables.

•

New Model Respirator

The aluminum model Dustfoe respirator, manufactured by the Mine Safety Appliances Co., Pittsburgh, Pa., is now available in all-plastic model approved by the U. S. Bureau of Mines. Known as the Clear-Vue Model Dustfoe, it is a compact lightweight unit made of transparent plastic—odorless, non-corrosive and non-conductor of electricity and heat, states the company.

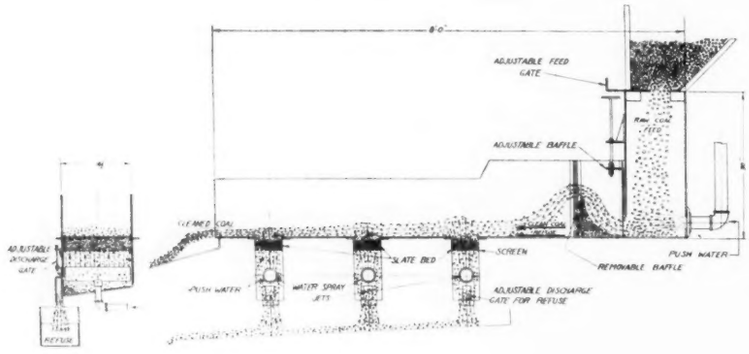
Its transparent construction makes possible the inspection of the filter for proper insertion and seal without removal from the respirator. A plastic catch on the filter case locks positively in place only when the filters are in the correct position. The unit is comfortable to wear and gives approved protection against all pneumoconiosis-producing, nuisance or toxic dusts. The self-adjusting facepiece has a new form-molded sponge-rubber face cushion. An Army-type exhalation valve provides immediate drainage of any condensation from the facepiece. Goggles or head coverings can be worn without interference. Bulletin CM-6, giving full details, is available from the company, Braddock, Thomas and Meade Sts., Pittsburgh, Pa.

•

Mining Headlight

Melvin C. Young, Springfield, Ill., offers the "Twinlite" system of headlighting for mining equipment. The system embodies the twin idea, based on an economy charging circuit whereby two lamps are lighted without taking more current from the d.c. power line than if only one were burned.

Advantages claimed for the system are:

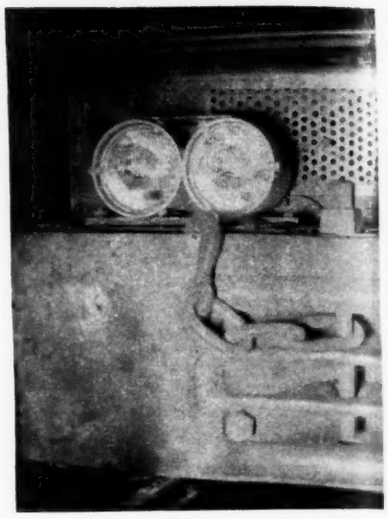


TEST NO. 1

Size of Coal	Percent Ash in Feed	Percent Ash in Coal	Percent Ash in Refuse	Prepared Coal Per Hour
No. 1 Buck	21.10	7.54	68.33	15 tons
No. 4 Buck	18.74	10.15	54.17	15 tons

TEST NO. 2

Rice	19.1	10.7	73.4	15 tons
Barley	27.4	6.7	72.5	15 tons
No. 4 Buck	24.7	10.3	69.7	15 tons



twin-sealed beam two-filament lamps by General Electric using one filament at a time, with two spare filaments held in reserve; specially built lighting batteries kept automatically charged assure 100 percent lighting in spite of low trolley voltage, pole leaving wire, power failures, etc.; all-steel arc-welded housing protects the lamps, occupies a minimum of space and can be mounted vertically or horizontally; 6-12 volt balanced circuit makes lamp connecting foolproof and the burning out of one lamp does not interfere with the other one.

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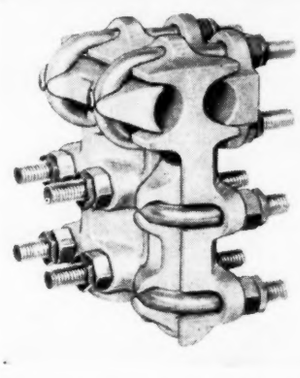
Multiple Cable Connectors

To provide facilities for connecting and terminating multiple cables, Delta-Star Electric Co., Chicago, offers high-compression solderless cable fittings in tees,

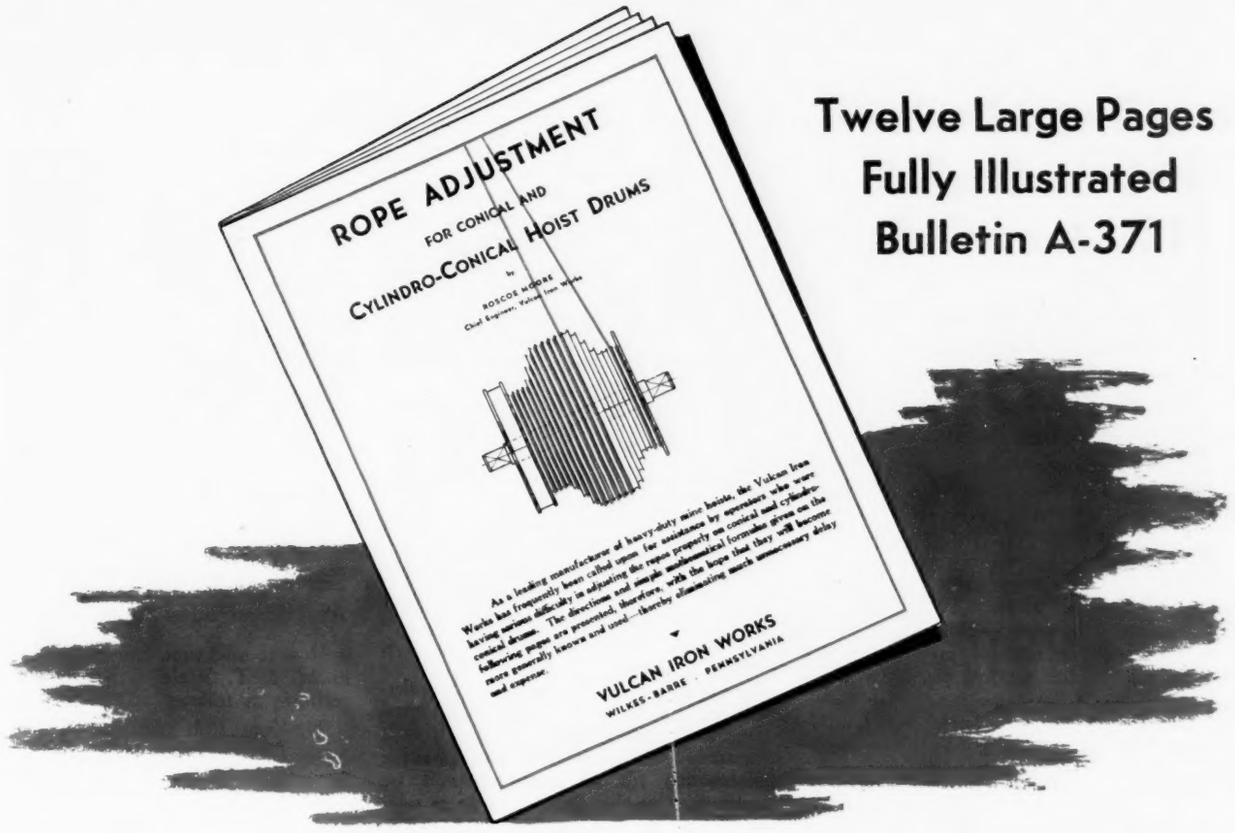


straight connectors and cable to flat bars or tubing types. All standard cable sizes can be accommodated up to 1,000,000 cm.

•

Headguard-Eyeshield

A practical means of combining convenient, non-fogging eye protection with the M.S.A. Skullgard's head safety is now available in the Skullgard-eyeshield, states the Mine Safety Appliances Co., Pittsburgh, Pa. Designed to deflect hazardous flying particles, the shield may be quickly



Twelve Large Pages
Fully Illustrated
Bulletin A-371

This New Bulletin Might Easily Save You Many Hours of Precious Working Time . . .

Every experienced mining man knows how difficult it is to adjust the ropes on conical and cylindro-conical hoist drums so that each cage or skip will come in correct alignment with both the top and bottom landings. Hours, even days, of precious working time are often lost while mine mechanics try to solve this problem by cut-and-try methods—a waste which is especially regrettable at the present time when every pound of coal or ore is badly needed.

Now Vulcan offers a time-proved remedy. The new twelve-page bulletin illustrated above contains simple diagrams and formulas by means of which anyone who can add, subtract, multiply and divide, can determine exactly how much to take in or let out, on each rope, for any of the nine different conditions of misalignment that may occur. It also contains complete instructions for installing ropes on any large hoist with minimum trouble and expense.

We want everyone whose responsibilities include the operation of large hoists to have a copy of this bulletin (No. A-371) and will mail it promptly on request. Tell us, also, about any other hoist troubles you may have—Vulcan engineers will be glad to give you the benefit of our 90 years' experience without charge or obligation of any kind.

VULCAN IRON WORKS

WILKES-BARRE • PENNA.

New York Office • 50 Church St.

Heavy-Duty Electric Hoists
Steam Hoisting Engines
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Sheaves, Pulleys, etc.
Cages, Skips, Gunboats
Coal-Preparation Equipment
Iron and Steel Castings

Steam Locomotives
Electric Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Improved Vertical Kilns
Quick-Lime Hydrators
Ball, Rod and Tube Mills
Roasters, Calciners, Retorts, etc.

and easily attached to any Skullgard already in use, it is stated.

Affording full vision and comfort, the transparent plastic shield is so hinged that it is readily positioned before the eyes in proper facial curvature by a downward flip, and when not in use lies flat against the brim. The eyeshield may be ordered with all types of M.S.A. Skullgards and Comfo caps or may be had separately for attachment to hats and caps already in service. Bulletin CE-18, giving easy-to-understand instructions, may be obtained from the manufacturer.

•

Care of Centrifugal Pumps Put on Wartime Basis

Specific recommendations for putting pump care on a wartime basis are given in a booklet issued by Allis-Chalmers Mfg. Co., Milwaukee, Wis. Twelve maintenance rules presented are:

"1. If there's any danger that foreign matter (sticks, refuse, etc.) may be sucked into the pump—clogging or wearing the impeller unduly—provide the intake end of the suction piping with a suitable screen."

"2. Never pump a liquid for which the pump was not designed. Whenever a change in pump application is contemplated and there's any doubt as to the pump's ability to resist the different liquid, check with your pump manufacturer!"

"3. Keep the right amount of the right lubricant in bearings at all times. Follow your pump manufacturer's lubrication instructions to the letter. Main points to keep in mind: (a) Although too much oil won't harm sleeve bearings, too much grease in anti-friction type bearings (ball or roller) will promote friction and heat. Main job of grease in anti-friction bearings is to protect steel elements against corrosion, not friction. (b) Operating conditions vary so widely that no one rule as to frequency of changing lubricant will fit all pumps. So play safe: if anything, change lubricant before it's too warm or too dirty—especially in wartime."

"4. See that pump and motor flanges are parallel vertically and axially—and that they're kept that way."

"5. Any down-sloping toward the pump in suction piping should be corrected. This rule is very important. Loss of suction greatly endangers a pump."

"6. See that piping puts absolutely no strain on the pump casing. When the original installation is made, all piping should be in place and self-supporting before connection. Openings should meet with no force. Otherwise the casing is apt to be cracked, or sprung enough to allow closely fitted pump parts to rub. It's good practice to check piping supports regularly to see that loosening, or settling of the building, hasn't put strains on the casing."

"7. Never allow a pump to run dry (either through lack of proper priming when starting or through loss of suction when operating). Water is a lubricant between rings and casing."

"8. Examine wearing rings at regular intervals. When seriously worn, their replacement will greatly improve pump efficiency."

"9. Packing should be replaced periodically—depending on conditions—using the packing recommended by your pump manufacturer. Forcing in a ring or two of new packing instead of replacing worn packing is bad practice. It's apt to displace the lantern ring. Put each ring of packing in separately, seating it firmly before adding the next. Stagger adjacent rings so the points where their ends meet do not coincide."

"10. Never tighten a gland more than necessary, as excessive pressure will wear shaft sleeves unduly."

"11. If shaft sleeves are badly scored, replace them immediately, or packing life will be entirely too short."

"12. If the liquid being pumped contains grit, a separate source of sealing liquid should be obtained (e.g., it may be possible to direct some of the pumped liquid into a container and settle the grit out). To control liquid flow, draw up the gland just tight enough so a thin stream flows from the stuffing box during pump operation."

A maintenance timetable is appended —"a timetable, not *the* timetable! Operating conditions vary so widely that to recommend one schedule of preventive maintenance for all pumps would be absurd. So consider this timetable as relative. But if the recommended inspection and service operations seem entirely too frequent, remember that most pumps are working four times as many hours a week as in peacetime. They need more attention now!

"Every Year

"Remove rotating element. Inspect thoroughly for wear—ordering replacement parts where necessary. Check wearing ring clearances. Generally, they should be approximately no more than 0.003 in. per inch on diameter of wearing rings.

"Remove any deposit or scaling. Clean out water-seal piping.

"Measure total dynamic suction and discharge lifts as test of pipe condition. Record figures and compare them with figures of next test.

"Inspect foot valves and check valves—especially check valves, which must safeguard against water hammer when pump stops.

"Every 6 Months

"Replace packing—using grade recommended by pump manufacturer. Be sure lantern rings are centered in stuffing boxes at the entrance of water-seal piping.

"Check shaft sleeves for scoring that would accelerate packing wear—ordering new sleeves if needed.

"Check alignment of pump and motor—shimming up units as needed. If misalignment recurs frequently, inspect entire piping system. Unbolt piping at suction and discharge nozzles to see if it springs away—indicating strain on casing. Check all piping supports for soundness and effective support of load.

"Every 3 Months

"Drain lubricant, washing out oil wells and bearings with kerosene. In the case of sleeve bearings, check to see that oil rings are free to turn with the shaft. Repair or replace if defective. Refill with lubricant recommended by your pump manufacturer.

"Measure bearings for wear, replacing if excessive. Generally, allow 0.002 in. clearance—plus 0.001 in. for each inch or fraction of an inch of shaft-journal diameter.

"Every Month

"Check bearing temperature with thermometer, not by hand. If anti-friction bearings are running hot, probably they have too much lubricant. Relieve. If sleeve bearings are running too hot, probably they need more lubricant. If change in lubrication doesn't correct condition, disassemble and inspect bearing. Or possibly the alignment of pump and motor should be checked."

•

Six Ways to Save Time And Electrodes

How to save time and electrodes is told in *M. & T. Welding Briefs* in six suggestions, as follows:

"1. Keep stub end loss to the minimum. Position work wherever possible for down-hand welding and use largest sizes and longest rods that are practical.

"2. Wherever possible, don't use more than eight passes to the inch for butt welds. Otherwise both electrodes and cleaning time are wasted.

"3. Fit-up properly. Electrodes are too precious to use in correcting mistakes of the fit-up gang.

"4. In making plug welds and bosses, burn the rod right down to the stub, change the rod and continue welding before the metal and slag cool.

"5. Use jigs and fixtures wherever possible. This eliminates layout work and tack welding, keeps parts in alignment and accessible for welding, and holds tolerances.

"6. Use 18-in. rods wherever practical. In spite of greater currents and higher speeds of 14-in. rods, the shorter rod wastes time and electrodes because of extra stub end loss and time lost in changing electrodes."

•

Periodic Overhead Inspections Advised for Wartime Upkeep

"When one stops to consider mine overhead, he becomes acutely aware of the importance of the power distribution circuit—the heart and artery system of a mine," says a recent issue of *O-B Haulage Ways*. "Stop it and you stop the mine workings; keep it alive and you assure an ample supply of power for continuous production. This was never more true than today, a time when power outages and work stoppages can be measured directly in terms of lost tonnage and fewer implements of war.

"One good way to keep this vital power circuit alive is to maintain all of its component materials in tip-top working con-

10 COMMANDMENTS FOR LONGER ROPE LIFE

not forgetting

HAZARD'S *ENDURING*

LAY·SET

Preformed

Conserve steel by making every piece of equipment last longer. Steady production by keeping your machines in uninterrupted operation. Since the operation of your machines depends upon wire rope, make sure your operators keep these commandments:—

1. Inspect, clean and lubricate all wire rope regularly. Tighten fittings.
2. Be sure the rope is the proper one for the service. Ask your Hazard wire rope man.
3. If drums or sheaves are small, or the kinking tendency pronounced, specify LAY-SET Preformed, the rope that resists bending fatigue and kinking.
4. Check your sheave or drum grooves. Worn grooves play havoc with wire rope.
5. Don't let rope rub against any standing part.
6. If the rope deviates from the center plane of the sheave more than 1½ degrees, undue wear will result.
7. Keep sheaves aligned and bearings tight and properly lubricated.
8. Don't allow bad spooling on drums. Hazard LAY-SET Preformed spools evenly under most conditions.
9. Don't jam on power or brake. Jerky operation accelerates rope failure.
10. Don't let a load spin and twist the rope.

Get the experienced recommendations of a Hazard wire rope man. Specify Hazard LAY-SET Preformed for a rope that resists bending fatigue, kinking and snarling. Use LAY-SET because it spools better, is faster and safer to handle, lasts longer.

Keep equipment in good condition. Make it last longer.

GREEN SIGNIFIES SAFETY

HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

HAZARD LAY·SET WIRE ROPE

dition. Since these materials are located in almost all parts of the mine, a system of periodic inspection should be set up to insure immediate replacement of all worn parts and positive maintenance of all expendable items. Following are a few tips which may prove of value in instigating such a periodic check-up in your mine.

"1. Divide your maintenance work into three divisions: (a) continuous visual inspection of all wearing parts; (b) periodic, detailed inspection trips of entire workings; (c) replacement and repair of worn and expended materials.

"2. Set up a group of maintenance wardens. Appoint your locomotive men, foremen or other reliable workers who cover a sizable part of the mine daily to handle this work. These men should be constantly on the alert for potential sources of electrical or mechanical breakdown, paying particular attention to hangers, clamps, frogs, switches, dropped wires, etc. These troubles should be reported immediately and corrected.

"3. Institute a general periodic inspection of the entire mine workings to be made at a regular frequency. A suggested method would be to start at the drift mouth or shaft bottom and inspect the main haulageways for their entire length, following with the individual entries or headings.

"4. Wherever possible, maintain the initial operating condition of the materials.

"5. Make all necessary repairs and replacements as soon as possible."

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Industrial Notes

Mine Safety Appliances Co., Pittsburgh, Pa., was formally presented with the U. S. Maritime Commission "M" Pennant and Victory Fleet Flag at exercises March 20 in Syria Mosque, Pittsburgh. The presentation address was made by Charles E. Walsh Jr., Director of Procurement, U. S. Maritime Commission Acceptance for the company was by George H. Deike, M.S.A. president; for the employees by Charles Ziemke. John T. Ryan Jr., general manager of the company, delivered an address on "What These Awards Mean to M.S.A."

Bituminous Casualty Corp., Rock Island, Ill., announces the resignation of H. E. Morrow, superintendent of agents, to join R. B. Jones & Sons, Inc., Kansas City, Mo., as manager of the compensation, liability and automobile department in Kansas City.

John P. Caluwaert, manager of welding sales for the J. E. Haseltine Co., Portland, Ore., has resigned to accept a position as welding engineer for the Stoody Co., Whittier, Calif., manufacturer of hard facing alloys. He will still serve the eastern Oregon and Washington territory.

General Electric Co.'s Bridgeport (Conn.) works has been awarded the Army-Navy "E" pennant.

Reliance Electric & Engineering Co., Cleveland, Ohio, has elected S. B. Taylor, works manager since 1931, as manufacturing vice president. Officers reelected are Clarence D. Collens, president; H. Morley Hitchcock, vice president and treasurer; A. M. MacCutcheon, engineering vice president; James W. Corey, sales vice president; C. V. Putnam, secretary; and H. F. Walters, assistant treasurer.

Jenkins Bros., Bridgeport (Conn.) plant, manufacturing valves, has been awarded the "M" pennant by the U. S. Maritime Commission. The presentation was made by Charles E. Walsh, Director of Procurement. Governor Raymond E. Baldwin of Connecticut was the principal speaker.

De Laval Steam Turbine Co., Trenton, N. J., has received a renewal of the Navy "E" award made in May, 1942. The new award is for a period of six months and carries the right to add a white star to the Navy "E" burgee flown over the plant.

Metal & Thermit Corp., New York City, has named Orville T. Barnett, engineer of tests for Murex arc-welding electrodes, as production engineer for both arc-welding and Thermit welding divisions. He will continue to supervise quality control of welding electrode production at the Jersey City and East Chicago plants. E. A. Leaverty, purchasing agent of Metal & Thermit Corp., has been made general purchasing agent for the entire organization, including the plants at Jersey City, Carteret and Piscataway, N. J., and East Chicago and South San Francisco.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has appointed Thomas C. Finnell as manager of the industrial department in the eastern district. He succeeds C. W. Miller, who was named manager of the application department of the radio division at Baltimore.

•

Trade Literature

Cast-Tooth Sprockets—Link-Belt Co., Chicago. Booklet 2067 lists the sizes of cast-tooth sprocket wheels that are available quickly from stocks carried at the company's plants and warehouses, and by authorized distributors located in industrial centers. This includes sprockets for Ewart detachable "H" Class, SM, SS, XS, GL, "C" Class and "800" Class chains. List prices, dimensions and weights are given. Tabulated also are sizes of wheels that have been most commonly ordered over a period of years.

Deaeration of Boiler Feed and Process Water—Cochrane Corp., Philadelphia, Pa. Publication 3005 explains tray-type deaerators, atomizing deaerators, deaerating hot-water generators and cold-water deaerators. Sections are devoted to flow diagrams, corrosion control, metering deaerating equipment with V-notch recorder and electrical systems for recording flow at a distance when the recorder is located on a centralized panel board. Illustrations show various designs constructed to meet space limitations and operating requirements.

Electrical Equipment — Delta-Star Electric Co., Chicago. Publication 4301 describes and lists multiple-finger, single- and double-throw, outdoor form disconnect switches in capacities up to 1,200 amp. and voltage ratings up to 69 kv. Construction details, dimensions and high-pressure contact arrangements, together with types of contact lugs, are shown.

Gas Welding—Air Reduction Co., New York City. Bulletin explains the welding of piping, giving specifications, standards, designs and other information. Chart for oxyacetylene flame adjustment shows natural color illustrations of five fundamental flame adjustments.

Hydraulic Equipment — Blackhawk Mfg. Co., Milwaukee, Wis. Catalog N-43 lists hydraulic hand jacks, 3 to 50 tons capacity; wheeled service jacks, gage-equipped jacks; "Porto-Power" hydraulic units, maintenance kits, motor vehicle assortments and pipe benders.

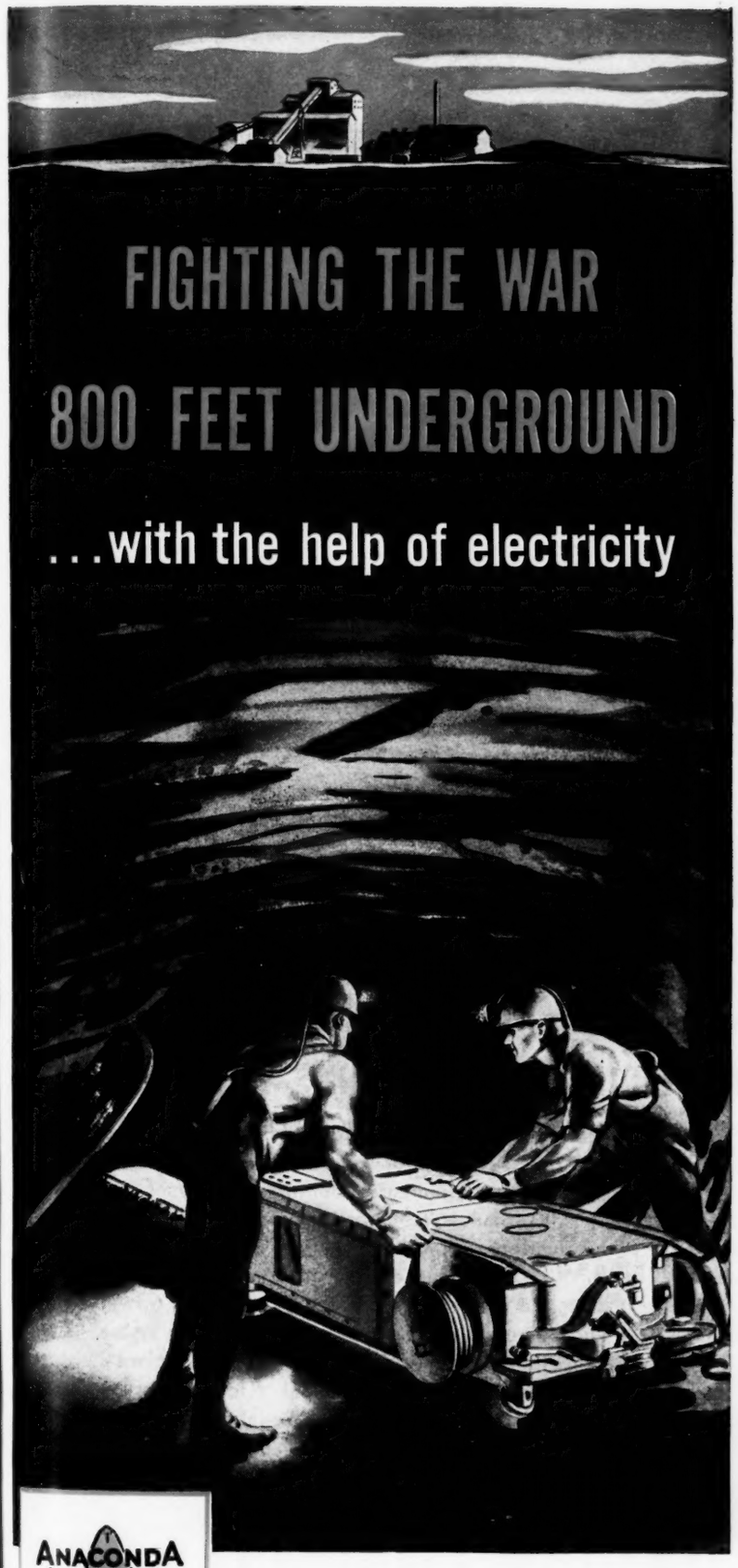
Lathe Upkeep—South Bend Lathe Works, South Bend, Ind. Booklet, "Keep Your Lathe in Trim," covers testing of motors and power supply; shortening, splicing and adjusting belts; testing and adjusting spindle bearings; and adjusting dovetail gibs. Also full information is given on how to measure and adjust the setover of the tailstock top to realign lathe centers and to turn tapers. Halftones and line drawings illustrate the various methods of making these adjustments.

Piping Jobs—Crane Co., Chicago. Piping Pointers bulletin, designed to provide helps in meeting piping material shortages, gives a few examples of wartime piping ingenuity, telling how to get piping jobs done in face of material shortages.

Print Maker—Peck & Harvey, Chicago. Folder describing the Spee-Dee printer for blueprints and black and white prints gives three easy steps to making perfect prints.

Transmission and Materials-Handling Equipment—Link-Belt Co., Chicago. General Catalog 850 of standard equipment gives dimensions, weights, list prices and other pertinent data on chains, sprockets, silent and roller chain drives, bearings, baseplates, take-ups, shafting, couplings, collars, clutches, pulleys, gears, buckets, conveyor idlers, screw conveyors, car spotters, speed reducers, etc.

V-Belting—Manheim Mfg. & Belting Co., Manheim, Pa. Catalog on Veelos adjustable V-belting shows in detail the sequence of operations to take the belt apart at any point with an ordinary screwdriver, then shows the necessary steps to couple the belt together again without any tools; illustrated is the procedure to be used in installing the belt on the drive. Complete engineering data are given as well as a sample calculation to determine the necessary size of a drive.



In our nation's drive to victory, electrical power and the research-built Anaconda mining cables that carry it are helping vital mine production.

To keep mine production steady, operators use large quantities of electrical power . . . delivered through modern research-built wires and cables like Anaconda's tough, rubber-saving Duracord* and its all-rubber companion, Sunex Securityflex*.

Of particular interest today, with the conservation of rubber all-important, is Duracord. This construction was developed during the last war to meet the need for super-strength cords and cables. Its "fire hose" jacket, woven from long fiber cotton, makes Duracord tough on the outside—the weak spot in most cables.

The Duracord jacket makes possible rubber savings as high as 50% without sacrificing any efficiency. For further information, please write us immediately.

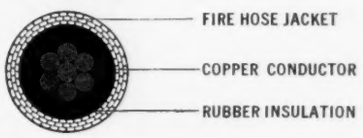
*Reg. U. S. Pat. Off.

ATTENTION!

Save Rubber with **DURACORD** *without Loss of Efficiency*

Here's a way you can effectively conserve rubber supplies and still get long-lived heavy duty electrical cords and cables . . . use Duracord.

This construction has served in some places for more than twenty years and it is still in use today. It is *not* a new construction.



ANACONDA WIRE & CABLE COMPANY
General Offices: 25 Broadway, New York City
Chicago Office: 20 North Wacker Drive
Subsidiary of Anaconda Copper Mining Company
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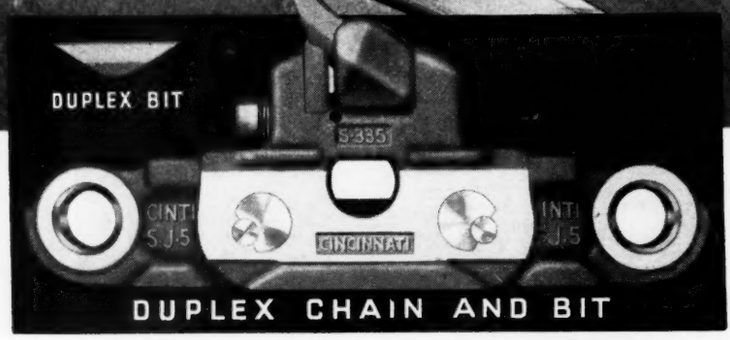
ANACONDA
from mine to consumer

This familiar trade-mark symbolizes the best efforts of modern research and production.

Sunex Securityflex and Duracord

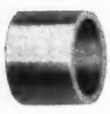
ANACONDA WIRE & CABLE COMPANY

Official U. S. Army Air Force Photo



COAL IS AMMUNITION

WIN THE BATTLE OF PRODUCTION WITH CINCINNATI CHAINS AND BITS



Replaceable long-life, hardened alloy steel Connector Insert that gives new factory joint accuracy to a worn connector.

Alloy Steel heat-treated Rivet that holds bearing pin against longitudinal displacement. Easily removed.

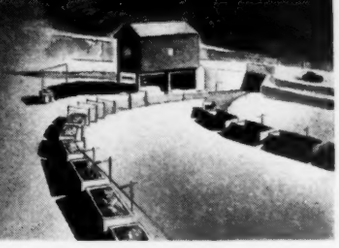
Hardened Eccentric Pin is designed so it can't turn in block . . . placing Joint Wear between pin and insert.

OUR war effort and domestic civilian life is built around power and heat. The major source of power and heat is COAL with tonnage requirements mounting steadily. Coal, like food, guns, tanks, planes and ships is ammunition . . . Win the Battle of Production with CINCINNATI CHAINS, BITS, and CUTTER BARS. Cincinnati cutting equipment is built to TAKE IT . . . designed to cut maintenance . . . to reduce power consumption and increase production. Thousands of Mine Operators are meeting production schedules with Cincinnati Chains and double-ended, reversible Bits at a lower per ton cost. No cutting job is too tough—delays are infrequent—and repairs when necessary are easily and inexpensively made.

THE CINCINNATI MINE MACHINERY CO.

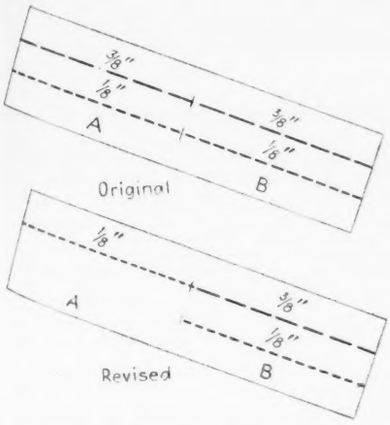
2988 SPRING GROVE AVENUE • CINCINNATI, OHIO

TIMELY OPERATING IDEAS



Vibrator Blinding Corrected By Cloth Changes

That a reduction in screen area—but accompanied by a rearrangement of plates—can accomplish a better job of screening was demonstrated by changes made in tuning up the new central preparation plant of the Consolidation Coal Co., Jenkins, Ky. (see p. 65 of this issue). The difficulty overcome was a degree of blinding on the five vibrating screens working on 1¼-in. x 0 and taking out ⅜ x ⅛-in. and ⅛-in. x 0.



One section of screen cloth removed and the top section, A, changed.

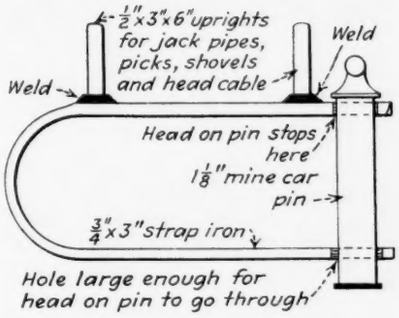
Referring to the drawing, which shows dimensions of the openings in the sections of screen cloth, Section A of the lower deck was the one which blinded, and it was reasoned that this was due to the load plus a lack of coarse material to provide a scrubbing action.

In the change, shown in the lower drawing, a large part of the minus ⅛-in. goes through Section A, which gets the scrubbing effect of 1¼x⅜-in. Very little blinding takes place on the other ⅛-in. section, B, of the lower deck.

•

Cutter Chain Safety Lock Also Holds Tools

Positive operation is cited for the cutter-chain safety lock shown in the accompanying illustration, submitted by E. C. Hitchcock, Summerlee, W. Va. If the bit clutch is engaged accidentally or otherwise, some other part of the machine will give before the safety lock will come off. The uprights welded onto the lock are a feature well liked by the machinemen, says Mr. Hitchcock, as they provide a convenient place for tools and head cable. With this provision, the machinemen do not forget to put the safety lock on when they load up.


½"x3"x6" uprights for jack pipes, picks, shovels and head cable
Weld
Weld
Head on pin stops here
1⅛" mine car pin
¾"x3" strap iron
Hole large enough for head on pin to go through

Details of cutter chain lock.

•

Air Line and Iron Clapper Used as Signal Systems

Use of the ¾-in. air line as a signal system won a prize of $10 for August Ollendyke, maintenance foreman at Olyphant and Eddy Creek collieries, Hudson Coal Co., as the best suggestion for a substitute for the existing signaling system used on shaker chutes employing rubber-covered cables. The winning suggestion was that the compressed air be shut off at the bottom of the place and the pipe from there to the face be used as a buffer line. Pushing a small buffer attached to the air line in the face blows a whistle attached to the shut-off valve at the loading point.

Where only electric drills are used instead of the compressed-air variety, calling for a different type signal, Peter Marion, an electrical laborer, first class, won a prize of $5 for his suggestion that a sheet-iron clapper at the loading point be rung by a rope strung on props to the working face. Robert Von Storch, special engineer on machine mining, acted as judge of the contest.

•

Loader-Conveyor Improvements Prevent Production Delays

Mechanics at the Blue Bird Coal Co., Carrier Mills, Ill., have worked out two helpful improvements for their mechanical mining equipment. The first, a better method of anchoring conveyor swing cables to the terminals by which they are attached to Joy loaders, is shown in Figs. 1 and 2. The rope is assembled in the terminal, put in a hydraulic press and 150 tons' pressure applied. Excess metal flows out between the jaws, leaving a slight bulge which is not objectionable. Ropes do not pull out of these terminals.

The second improvement eliminates the riding of either of the chains of a double chain conveyor on the rear or idler sprockets by eliminating the idler sprockets. A plain drum is substituted. It is true that chains of a double chain conveyor do not wear equally. The longer

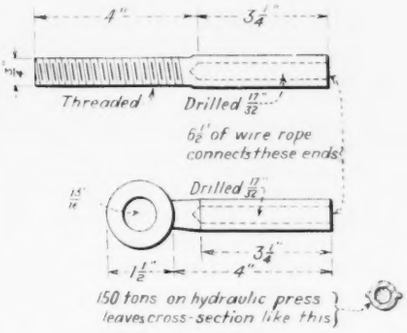


Fig. 1—Terminals for ropes: Joy swing conveyor.

Fig. 2—Rope and terminals assembled.

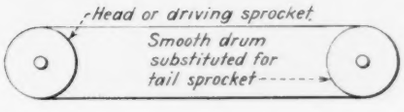


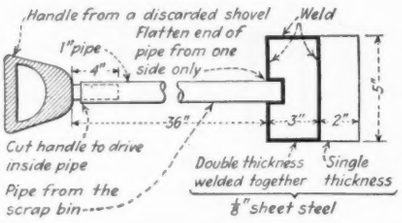
Fig. 3—Improved double chain conveyor drive.

chain may then get out of step and ride the idler sprocket, even breaking a chain or sprocket. This change has eliminated that sort of trouble and is said to save a good deal of time heretofore lost.

•

Cleaner for Pits or Sheds Made From Scrap

"In shops, motor pits or sheds where machines and locomotives are stored and oiled, it is a wearisome task to clean off waste oil and sand which sticks to the



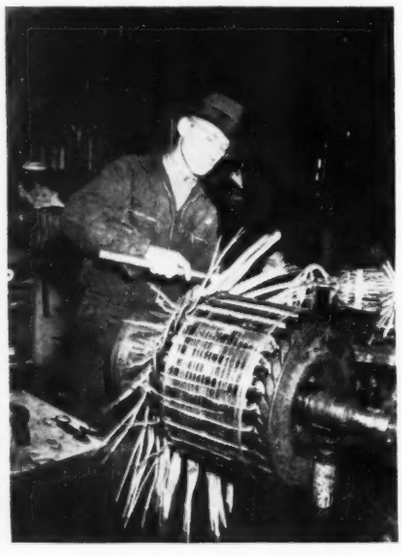
How cleaning tool is made.

wood or concrete floors by using a shovel or broom," declares E. C. Hitchcock, Summerlee, W. Va. With the tool illustrated, however, cleaning is quick and easy. The tool also may be used in cleaning reclaimed plate prior to welding or cutting, as well as for cleaning smooth metal, wood or concrete to be painted. Discarded parts are used in making the tool, with the blade constructed of shovel-blade steel or similar sheet steel.

•

Temporary Sticks and Bands Used During Baking

Tightly seated coils to prevent loosening and consequent movement during service life are necessary for a long-lived armature rewind job. Getting the coils down without too much pounding is quite a task on a locomotive armature such as the GE-711 here pictured.



Coils bound temporarily while leads are being connected to the commutator.

In this case hardwood sticks 1 in. thick and of about slot width have been placed over each coil and the whole assembly gradually has been compressed by temporary bands. These are applied by the weight and sheave method, which affords a convenient way of increasing tension for each rewrap of the bands.

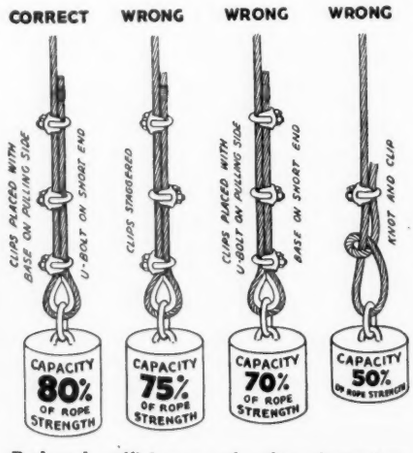
The armature is dipped and baked with this temporary clamping in place. After that the coils stay down while the temporary sticks are removed for applying the permanent wedges and bands. This is the practice in the central shop of the Consolidation Coal Co., Jenkins, Ky.

•

Importance of Proper Placing Of Wire-Rope Clips Shown

"The clip fastening shown in the accompanying picture," says F. L. Spangler, M.E., "is materially weakened because of the way the clips have been applied to the wire rope. Unfortunately, it is no worse than hundreds of other clip fastenings made by rope handlers who are either careless or just don't know any better. And in these days when replacements of wire rope or other equipment are hard to get, and machine shutdowns are more costly than ever before in all history, clips are mighty important.

"What's wrong with the application? (1) The clips are staggered instead of all being applied with the base, or saddle, against the pulling rope and the U-bolt against the short end. (2) The short end between the top two clips is slack and can't take any of the load; hence the top clip is useless, and we have the equivalent of only a three-clip fastening. (3) The bolts on the top clip obviously have been



Reduced efficiency of clip fastenings caused by incorrect application of clips or by bad design.

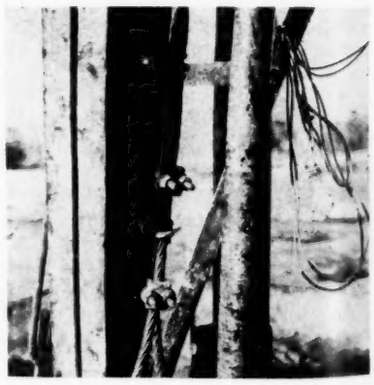
drawn too tight, thereby misshaping and weakening the rope at this point and still further reducing the efficiency of the fastening. (4) The two middle clips are too close together. Clips should be evenly spaced at about six times the rope diameter or more.

"Clips should not be drawn up too tight against the rope, but neither should they be permitted to become loose. With the clips fastened, all nuts should again be tightened after the rope has been put under tension. Clips should be tightened with every rope inspection.

"When inspecting clip fastenings, it is extremely important to examine the rope at the last clip farthest from the loop, or bight, as fatigue breaks often develop at this point because rope vibration or whipping is dampened here. Fatigue damage is less pronounced with preformed wire rope, which may be explained by the reduced tendency of preformed rope to vibrate or 'whip,' this type rope being more flexible and not so 'springy' as non-preformed.

"It is important to apply a sufficient number of clips; and the minimum number recommended for different sizes of rope is as follows:

Rope Diameter, In.	Number of Clips	Spacing of Clips, In.	Length of Wrench, In.
⅛ to ⅝	3	3	12
¾ to ⅞	4	4½	18
1 to 1⅛	4	6	24
1¼ to 1⅜	5–7	7	24
1½ to larger		10	24



Illustrating improper use of clips.

Knowledge Helps

When an unexpected problem crops up at a coal mine, generally it is the practical operating, electrical, mechanical or safety man who is called on to supply a quick solution. Furthermore, the duty of adapting equipment and methods to actual conditions encountered rests largely on his shoulders. This means that a wide knowledge of the workable short cuts is a distinct asset. There is no substitute as good. These pages serve as a clearing house for worth-while ideas developed by forward-looking men, and here is where your idea should find its place. Send it in, together with a photograph or sketch if either will make it clearer. *Coal Age* will pay $5 or more on publication for each acceptable item.

Don't Let *Corrosion* Sabotage Your Wire Rope

The illustration at the right was made from an unretouched photograph of a wire rope used for hoisting in a coal mine. It fell an early victim to corrosion because it was not kept properly lubricated.

Proper Lubrication Helps Wire Rope Resist Corrosion

CORROSION is an enemy saboteur that is constantly trying to destroy your wire rope. Unless combatted by proper lubrication, normal rope life is greatly shortened and a serious hazard to safety created.

Wire Rope is an intricate machine with many "bearings". If it is to give the full service of which it is actually capable, these points of contact—both externally and internally—must be kept correctly and adequately lubricated at all times.

The right kind of lubricant to use and the frequency with which it should be applied depends upon the conditions under which your rope is operating. When in doubt, we suggest you consult with an experienced wire rope manufacturer.

Now that steel is so urgently needed for so many implements of war, the more "work hours" you can get out of your wire ropes, the more steel you save for other vital purposes. So in all earnestness we repeat—*Don't let Corrosion sabotage your wire rope*

• *Important* •

An idle wire rope is more vulnerable to corrosion than one in use, so be sure to give your ropes the protection of a good lubricant when they are not in service.

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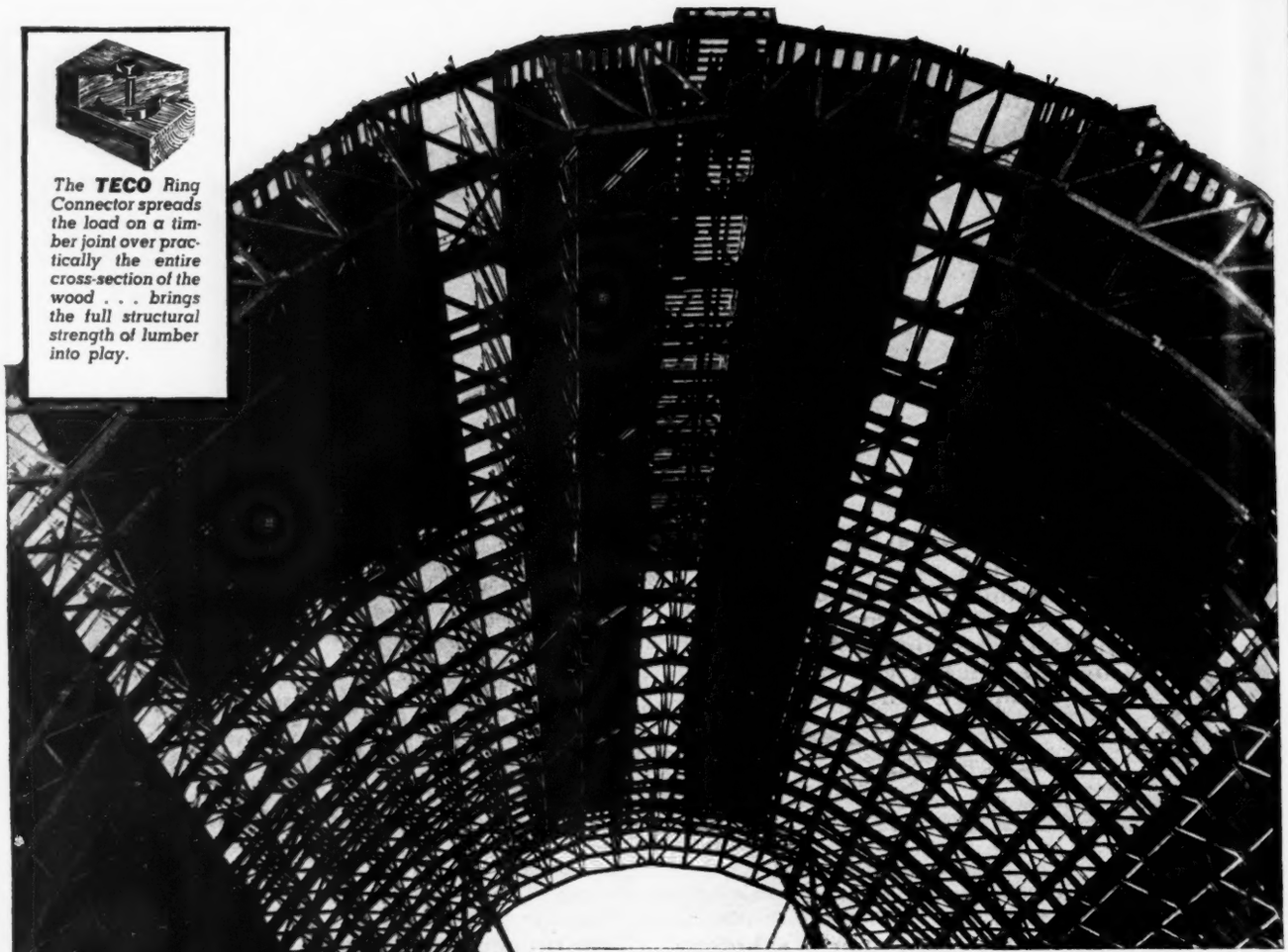
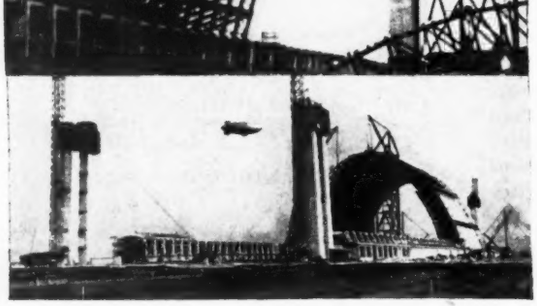




New Navy Blimp Hangar, 1000 feet long; 153 feet high; clear-span roof 237 feet. Timber treated for fire resistance according to Federal specifications. Trusses prefabricated by Timber Structures, Inc., Portland, Oregon.

OUR NAVY BUILDS WORLD'S GREATEST TIMBER STRUCTURE

mammoth blimp hangar was made possible by

TECO CONNECTOR ENGINEERING

Two announcements of the widest import to American engineering have just come out of Washington.

The U. S. Navy has announced that a giant blimp hangar, engineered entirely in timber, is nearing completion "somewhere in the continental United States."

The War Production Board has announced that "such a structure could not have been built of wood by ordinary methods without the use of timber connectors . . . The steel ring timber connector, which is used to increase the strength of joints in wood construction, saved more than 400,000 tons of steel for essential war production in 1942." WPB added that 2,050 tons of structural steel will be saved in this hangar alone.

In erecting this vast, multiple-truss assembly, Navy engineers have accomplished a notable achievement in modern timber connector engineering. The hangar is the latest of scores of large Navy, Army, and Maritime Commission projects built with Teco timber connectors under the revolutionary Teco system of timber engineering. It is one of *over 100,000* heavy-duty structures, of *over 600* types, built under the Teco connector system in the past few years. They include clear-span factories, bridges and trestles, towers, tanks, warehouses, docks, shipyards, and many others.

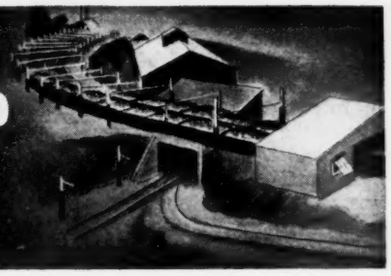
Write today for our FREE Reference Book for engineers and architects showing 45 *"Typical Designs of Timber Structures."*

TIMBER ENGINEERING COMPANY

NATIONAL MANUFACTURERS OF **TECO** *TIMBER CONNECTORS AND TOOLS*

WASHINGTON, D. C. **PORTLAND, OREGON**

COAL AGE NEWS ROUND-UP



Appalachian Extension Asked by Roosevelt; Operators and Miners Agree on 30 Days

Presidential Intervention Results in 30-Day Extension of Appalachian Agreements—Action Follows Telegrams From Operators—Little Headway Made in Agreeing on New Contracts up to March 31—Some Outlying Districts Enter Into Temporary Extension Agreements

ALTHOUGH no closer to an agreement than the day when negotiations were started, the threat of a stoppage in the bituminous coal fields of the United States was postponed at least 30 days when representatives of the United Mine Workers and the northern Appalachian operators agreed March 24, at the request of President Roosevelt, to extend the old contract 30 days with the proviso that the benefits of any new agreement would be made retroactive to April 1. The southern Appalachian group assented to a similar extension March 29. Meanwhile, it was announced that certain outlying districts were accepting extensions based on the retroactive principle. Anthracite negotiations also got under way in New York March 31.

President Roosevelt's request for a retroactive extension grew out of, as he himself stated, "telegrams I have received from the committees representing the operators and from the press reports of the various proposals made at the conference." His request took the form of telegrams to John L. Lewis; Charles O'Neill, spokesman for the northern Appalachian group, and Edward R. Burke, southern Appalachian spokesman. The text of these telegrams, dispatched late March 22, is as follows:

"The dispute between the United Mine Workers and the bituminous operators must be settled like any other labor dispute under the national no-strike agreement of Dec. 26, 1941, by the peaceful means set forth in Executive Order No. 9017 of Jan. 10, 1942; that is, by collective bargaining, conciliation and final determination, if necessary, by the National War Labor Board.

"From telegrams I have received from the committees representing the operators and from the press reports of the various proposals made at the conference, it is evident that the time remaining before the expiration of the contract on March 31 is too short. I therefore request the mine workers and the operators to follow the plan adopted at my suggestion in 1941; that is, to continue the uninterrupted production of coal under the terms and conditions of existing contracts until the differences that now separate the parties are peacefully and finally resolved, with the understanding that if the new agreement includes any wage adjustments, such adjustments shall be computed and applied retroactively from April 1, 1943.

"If any wage adjustments are made they must, of course, be made in accordance with the Act of Oct. 2, 1942, and Executive Order No. 9520. It would be unfair to the mine workers and to the operators unduly to prolong this period of uncertainty, and I am, therefore, asking everyone concerned to proceed with all speed consistent with the complete and fair-minded settlement of the dispute. If it is referred to agencies of the government, I shall make the same request of those in charge of such agencies.

"If there is a wage adjustment within the standards set forth in the Act of Oct. 2, 1942, and Executive Order No. 9520, the question of undue hardship to individual operators resulting from the agreement to make such adjustments retroactive to April 1, 1943, will be given due consideration by the agencies of the government concerned with costs and prices."

The Act of Oct. 2, 1942, referred to by the President is the Stabilization Act passed by Congress for the control of wages and prices as a guard against inflation. Executive Order No. 9520 created the Office of Economic Stabilization headed by James F. Byrnes. The act and executive order provide that "The National War Labor Board shall not approve any increase in the wage rates prevailing on Sept. 15, 1942, unless such increase is necessary to correct maladjustments or inequalities, to eliminate substandards of living, to correct gross inequities or to aid in the effective prosecution of the war; provided, however, that where the National War Labor Board or the Price Administrator shall have reason to believe that a proposed wage increase will require a change in the price ceiling of the commodity or service involved, such proposed increase, if approved by the National War Labor Board, shall become effective only if also approed by the Director [of Economic Stabilization]."

It already has been announced by Mr. Byrnes that "there must be no further increases in wages beyond the Little Steel formula except in limited and special cases to correct patently gross inequalities and to rectify plainly substandard wages." The formula in general provides that wage increases are not justified if they are in excess of 15 percent over levels prevailing in January, 1941.

After a hearing at the request of labor members, the War Labor Board on

Press Association photo

Armistice meeting—Thomas Kennedy, United Mine Workers, and Ezra Van Horn and Charles O'Neill, of the northern Appalachian operator group, go over the agreement for a 30-day contract extension.

March 22, by a vote of 8 to 4, rejected an A. F. of L. petition for scrapping the Little Steel formula, which provides a yardstick to govern granting increases of up to 15 percent to cover a corresponding rise in the cost of living between Jan. 1, 1941, and May 1, 1942.

Acceptance of the President's proposal was voted by the northern Appalachian group March 23 after a debate over whether the extension should be indefinite or for only 30 days. Lewis finally won out, the northern group accepting the following agreement:

"Whereas, the Government of the United States, through the President in his telegram dated March 22, 1943, addressed to the miners and operators of the Appalachian Joint Conference, requested that production of coal continue after April 1, 1943, therefore, it is jointly agreed by the undersigned representatives to the Appalachian Joint Conference as follows:

"That, pending continued negotiations, all mines in the Appalachian coal-producing area remain in operation for a period of thirty (30) days from April 1, under existing basic, district and supplemental agreements, with the understanding that any increase in wages or improvement in hours or working conditions later agreed upon shall be computed and apply retroactively from the date of April 1, 1943."

Washington Intervention Asked

The same agreement was presented to the southern group March 23. Meantime, this group had replied to the President's telegram that, in view of the necessity of having any agreement reviewed by the War Labor Board and the practical difficulties of recovering losses from interim sales of coal, "the practical solution of these difficulties is for the two government agencies just mentioned [WLB and OPA] to call both operators and miners to Washington immediately so that by April 1, if an agreement is not completed, the situation will at least be clarified to the extent that a proper and equitable method may be determined which will protect our employees and ourselves until the agreement is completed."

In line with this thought, the southern operators offered a counter proposal that extension be based on the language of the President's telegram and that no time limit be placed upon it. The language included in the southern proposal was that "if any wage adjustments are made they must, of course, be made in accordance with the Act of Oct. 2, 1942, and Executive Order No. 9520." The miners refusing, the southern group then offered the same proposal with a 30-day time limit. This also proved unacceptable to the miners, who contended that both the northern and southern agreements should be the same.

The divergence between the views of the United Mine Workers and the operators became apparent early in the course of the negotiations. The conference was called to order at the Biltmore Hotel March 10 by Ezra Van Horn, of Ohio, who was elected permanent chairman. Thomas Kennedy, U.M.W., was chosen permanent secretary; Truman H. Johnson, northern West Virginia, assistant secretary; M. L. Markel, sergeant-at-arms. In the roll call, representatives of the southern operators announced that they were not parties to the joint Appalachian agreement and would negotiate separately. A motion by John L. Lewis that Illinois and Indiana participate was rejected by the northern group. Lewis then began presentation of the miners' demands, reproduced in full elsewhere in this issue, stressing the $2 increase requested, the portal-to-portal day, unionization of supervisors, etc., and asking a one-year contract. Highlights of his address included attacks on the Little Steel formula and a discussion of rises in cost-of-living items as compared to miners' wages.

Continuing his address March 11, Lewis again asked that other regions be permitted to participate. Charles O'Neill then began the operators' reply, discussing hourly, weekly and annual rises in the miners' income, advocating support of the government's anti-inflation program and stressing the no-strike agreement made some time ago between labor and the administration. The operators, he declared, want to make an agreement and were ready to consider all demands. Addresses by union representatives was the order of business after completion of Mr. O'Neill's reply.

The southern group organized as the Southern Appalachian Joint Wage Conference and began negotiations at the Hotel Commodore March 12. Lawrence E. Tierney Jr., of Kentucky, was elected permanent chairman; Paul Reed, U.M.W., permanent secretary; J. J. Ardigo, southern West Virginia, assistant secretary; and H. G. Kennedy, southern West Virginia, as sergeant-at-arms. Mr. Lewis' presentation of the miners' demands at the northern conference was made a part of the record and ex-Senator Edward R. Burke, president, Southern Coal Producers' Association, replied for the operators. The operators, he declared, pledged no stoppage of work, asked support of inflation controls and were ready to negotiate on all points on which they had freedom of choice for negotiation. He asked the miners to join in a resolution forbidding a stoppage of work and suggested that in case there was no agreement or a wage adjustment was agreed upon that the questions be referred to the appropriate government agencies.

Conference Recess Proposed

Concurring in the position outlined by Mr. O'Neill, Mr. Burke stated that all concerned should be prepared to follow any government rulings on working hours and conditions, and at the end of his address offered a motion to the effect that "without prejudice, all proposals made by both miners and operators be tabled and that this conference now recess until a day three months after the President of the United States declares a cessation of hostilities. We further move that on that day this conference be reconvened for the purpose of considering the proposals on the table and any other which may at that time be properly brought before the conference. We further move that until that date, the present master agreement and all subsidiary district agreements remain in full force and effect." With the miners opposing, the motion was put to a vote and lost, whereupon the miners moved the adoption of their list of demands and started on a speaking tour in support.

Speeches continued on March 13, with miners' representatives expressing themselves strongly on their wage and other demands and demanding a contract. This also was the theme of remarks by Mr. Lewis at the northern conference March 15. "It is a safe assumption," he said, "that without a contract the miners will not trespass on your property after the 1st or 2d day of April."

By March 16, after repeated requests by the operators, both conferences agreed to appoint negotiating committees and get down to work. Representatives for the northern operators were: Mr. O'Neill, R. E. Jamison, Jamison Coal & Coke Co.; R. L. Ireland Jr., Hanna Coal Co.; William Findlay, Simpson Creek Collieries Co.; H. M. Moses, H. C. Frick Coke Co.; E. R. Price and Mr. Van Horn (chairman).

Negotiators for the southern operators

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Feb. 1 1943	—P.c. Change— From Jan. 1 1943	From Feb. 1 1942
Electric power utilities	19,276	−3.5	+57.8
Byproduct coke ovens	9,958	−7.1	+31.1
Steel and rolling mills	1,085	−4.8	+18.4
Railroads (Class 1)	11,575	−8.0	+28.5
Other industrials*	29,175	−7.2	+50.7
Total	71,069	−6.1	+48.5

Bituminous Coal Consumption

	Thousands Net Tons Jan. 1943	—P.c. Change— From Dec. 1942	From Jan. 1942
Electric power utilities	5,976	−3.0	+ 1.1
Byproduct coke ovens	7,681	+1.3	+ 3.7
Steel and rolling mills	1,049	+1.5	+ 0.3
Railroads (Class 1)	11,443	+2.6	+18.1
Other industrials*	15,281	+0.4	+ 5.9
Total	41,430	+0.7	+ 7.7

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Consumption

Bituminous

Month of February, 1943, net tons	48,920,000
P.c. change from February, 1942	+10.2
January-February, 1943, net tons	95,949,000
P.c. change from Jan.-Feb., 1942	+ 2.9

Anthracite

Month of February, 1943, net tons	5,092,000
P.c. change from February, 1942	+ 6.7
January-February, 1943, net tons	9,406,000
P.c. change from Jan.-Feb., 1942	+ 1.1

Sales of Domestic Stokers Vs. Oil Burners

	Coal Stokers	Oil Burners
January, 1943	1,764	2,070
P.c. change from Jan., 1942	−66.9	−84.1

Index of Business Activity*

Week ended March 20	201.1
P.c. change from month earlier	+ 2.1
P.c. change from year earlier	+14.3

**Business Week*, March 27.

Electric Power Output†

Week ended March 20, kw.-hr.	3,946,836,000
P.c. change from month earlier	−0.05
P.c. change from year earlier	+17.6

† Edison Electric Institute.

BELTING AND HOSE WITH "THE THUMB"

Aristotle said: "The superiority of man over animals lies in the hand; the superiority over men, in the thumb."

For the movement of materials and transmission of power by belts and hose and the control of power by industrial brake lining, Thermoid Products have that extra something that is symbolized by the thumb.

Thermoid builds these products with an approach that is unusual. Thermoid engineers and production technicians have a realistic viewpoint. They visualize these products in use in the field rather than as just so much footage or poundage going through a plant. No wonder Thermoid Industrial Rubber Products have an outstanding performance record—they are born with the extra serviceability symbolized by the thumb.

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P.S. In line with material conservation, Thermoid has prepared a series of bulletins on how to extend the life of rubber products now in use. You might find them helpful as reminders to your operating people. Feel free to ask for copies.

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IT'S GOOD BUSINESS TO DO BUSINESS WITH THERMOID

Acme photo

North-South conclave—Don Rose (left), counsel, Western Pennsylvania Coal Operators' Association, and R. L. Ireland Jr., Hanna Coal Co., confer with Edward R. Burke, chairman, Southern Coal Producers' Association.

were: Mr. Burke, H. A. McAllister, McCall Coal Co.; F. M. Medaris, Harvey Coal Corp., Inc.; M. L. Garvey, Hal M. Scott, Winding Gulf Operators' Association; and (ex-officio) Messrs. Tierney, Kennedy and Ardigo.

Northern operators, on March 18, offered an extension without retroactive provisions to April 30, which proposal was rejected by the miners March 19. That same day, the union policy committee authorized the negotiation of temporary contracts in outlaying districts, with such agreement "to extend existing wage scales from April, 1943, with the understanding that any wage increases or changed conditions finally agreed to in the Appalachian area will be binding upon the operators of the outlying districts, retroactive to April 1, 1943; and provided further that such agreement is subject to cancellation on five days' notice from the United Mine Workers of America. This policy is to be effective in the coal producing areas of the following states: Alabama, southern Tennessee, Oklahoma, Arkansas, Kansas, Missouri, west Kentucky (overlapping), Indiana, Illinois, Michigan, Iowa, Colorado, New Mexico, Wyoming, Montana, Utah and Washington."

Operators, in a letter from Mr. Lewis March 20, were asked to accept a 30-day retroactive extension. The northern group countered with a proposal "that pending continued negotiations, all mines in the Appalachian coal-producing area remain in operation for a period of thirty (30) days from April 1 under existing basic, district and supplemental agreements, with the understanding that any increase in wages and improvement in hours and working conditions later agreed upon be computed and applied from the date approved and fixed by the governmental agency having jurisdiction." The southern group made substantially the same proposal except that no time limit was placed on the extension.

With no further developments of note, receipt of the President's telegrams late March 22 resulted in the actions leading up to the signing of the extension agreements summarized at the beginning of this news report.

Miners' representatives announced March 23 that Missouri and Oklahoma had signed the temporary extension agreements authorized by the union policy committee. The Illinois Coal Operators' Association signed an extension agreement March 24. Meantime, both this association and the Illinois Coal Producers' Association, which also agreed with the Progressive Miners of America on an extension March 19, had met with Governor Dwight H. Green March 23 to canvass ways and means of preventing a stoppage. Indiana signed on March 31.

Negotiations between the Illinois Coal Producers' Association and the Progressive Miners of America got under way March 1. In February, the union, attacking the Little Steel formula, voted, among other things, to ask for an increase of $2 a day in the higher brackets and $3 in the lower. March 10, representatives of both the operators and the Progressives went to Washington to confer with the War Labor Board. Proceedings were resumed March 16. On March 17, the union telegraphed the President, William Green, A. F. of L. head, and the War Labor Board protesting against the Little Steel formula. March 24, the Progressives, together with District 12, United Mine Workers, and representatives of both operator groups attended the conference called by Governor Green.

Negotiations for a new anthracite agreement to replace the contract expiring April 30 got under way at the Waldorf Astoria Hotel, New York City, on March 31, with the miners pressing the demands voted at the Tri-District Convention March 4-6. These demands are reproduced in full following the material on bituminous demands at the end of this news summary.

WAGE-SCALE INCREASES ASKED AND PROPOSED CORRECTIONS OF MINING PRACTICES FOR THE BITUMINOUS COAL INDUSTRY ADOPTED BY THE INTERNATIONAL POLICY COMMITTEE OF THE UNITED MINE WORKERS OF AMERICA, MARCH 9

The International Policy Committee declares the recommendations contained herein to be the policy of the United Mine Workers of America.

This policy shall be a guide for all districts in the bituminous regions in the negotiating of wage agreements. It shall serve in lieu of all wage-scale resolutions submitted to the International Policy Committee from the international convention, district conventions, local unions, or from any other source.

Appalachian Joint Conference Proposals

1. *Contract Termination.* That the Appalachian Joint Wage Agreement be extended from April 1, 1943, to March 31, 1944, inclusive, with the following modifications and changes, viz.: during the contract period, either party, through representatives designated by the Operators or the International Union, United Mine Workers of America, may terminate the joint wage agreement by giving thirty (30) days' notice in writing, in advance of such cancellation.

2. *Hours of Labor.* That the maximum hours and working-time provisions of the joint wage agreement, including the supplemental agreements regarding the six-day week, be reaffirmed with the following modifications:

(a) The six-day week to terminate when the war emergency ends.

(b) To conform with the basic and legal requirement for the industry, the maximum hours and working-time provisions be amended to establish portal-to-portal for starting and quitting time for all underground workers.

3. *Wage-Rate Increases.* Combined cutting and loading rates shall be increased 28¼ cents per ton; 25¼ cents of this amount shall be added to the existing rates for loaders and 3 cents to existing cutting rates.

Rates for all classifications of inside and outside day men shall be increased $2.00 per day, except those classifications with substandard wages, namely: greasers, trappers, flaggers, switch throwers and slate pickers, who shall be increased an additional 85 cents per day.

Monthly men shall receive a directly proportionate increase.

The minimum day rate shall be $8.00 without exception.

The increased rates include compensation to meet the portal-to-portal starting and quitting time.

Pick-mining rates shall be increased 28¼ cents per ton.

Yardage and deadwork rates shall be increased 28.57 percent.

Cutting rates on track-mounted machines shall be increased 3 cents per ton. Where tonnage rates are paid on conveyors or other mechanical loading devices, the increase shall be 25¼ cents per ton. Footage and yardage rates shall be increased 28.57 percent.

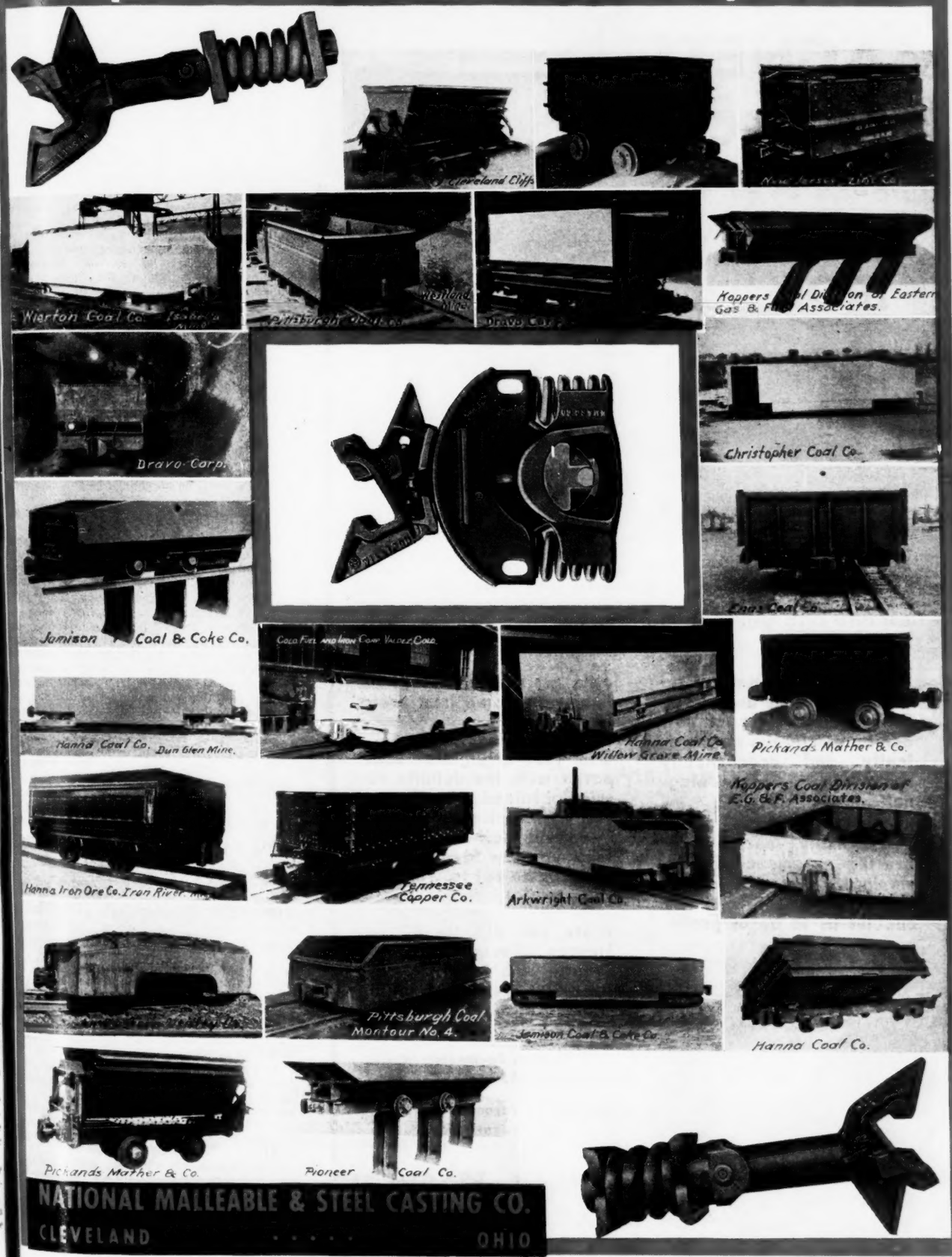
4. *Standard Classifications.* Standard classifications of men employed on the various mechanized units shall be established in order to eliminate varying sizes of crews. Such classifications shall be uniform both as to day and tonnage workers.

5. *Monthly Men in Strip Mining.* The day and monthly men employed at strip mining operations will have the same wage increases applied and governed by the basic two-dollar per day increase.

6. *Double Time for Sunday.* Double time shall be paid for all work performed on Sunday.

7. *Vacation Payment.* The compensation payments for the vacation period shall be increased to fifty dollars ($50.00).

WILLISON AUTOMATIC COUPLERS
Speed Production At Many Mines


Nierton Coal Co.
Dravo Corp.
Christopher Coal Co.
Jamison Coal & Coke Co.
Hanna Coal Co. Dun Glen Mine.
Hanna Coal Co. Willow Grove Mine.
Pickands Mather & Co.
Hanna Iron Ore Co. Iron River
Tennessee Copper Co.
Arkwright Coal Co.
Pittsburgh Coal Montour No. 4.
Jamison Coal & Coke Co.
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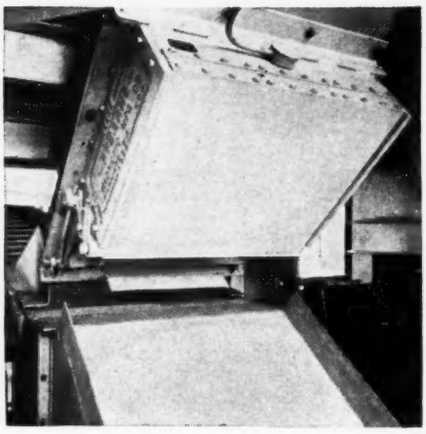
NATIONAL MALLEABLE & STEEL CASTING CO.
CLEVELAND · · · · · OHIO

Stearns

Spout MAGNETS PROTECT against TRAMP IRON



A typical Stearns Spout Magnet installation and the resulting accumulation of tramp iron from several days' operation. And—the scrap metal recovered helps substantially toward paying for the magnetic equipment.

In this age of mechanization, tramp iron and metallic junk in your coal flow can be efficiently, automatically and economically removed with Stearns Magnetic equipment.

Our many years of pioneering experience in designing magnetic equipment for the coal industry enables us to be of profitable assistance in controlling your tramp iron problem.

Cost is negligible compared with the definite results obtained. It will pay you to investigate Stearns Magnetic methods. Let us show you how Stearns magnets can be put to work for you.

Write for Bulletin 97 on Stearns Spout Magnets; Bulletin 302, Stearns Magnetic Pulleys; Bulletin 25, Suspended Magnets.

Stearns Engineers are well qualified to advise you.

Ask for our recommendations. No obligations.

STEARNS MAGNETIC MANUFACTURING CO.
661 S. 28th St., Milwaukee, Wis.

8. *Exemptions Under This Contract.* The term "mine worker," as used in this Agreement, shall include all persons inside or outside of the mine except the superintendent.

9. *Differentials.* Existing inequitable differentials within and between districts shall be eliminated, including cutting and loading rates and all other factors operating to maintain such differentials and inequalities.

10. *Shifts.* The operation of three shifts within 24 hours and concentrated methods of mining, that prevent rock-dusting, necessary ventilation to dilute inflammable and noxious gases, and proper inspection, have increased the hazards and resulted in great loss of life. In order to promote safety and establish sound mining practices we, therefore, demand modification of the provision in the Appalachian Joint Wage Agreement dealing with shifts by limiting the number of shifts so that not more than two can be operated within any 24 hours.

11. *Other Provisions.* Operators who are parties to this Agreement shall include clauses to protect the wage scales and conditions of employment whenever any of their mines are let to any corporation, company or individual for operating purposes. This obligation is to protect the contract and preserve the interest of the miners.

The Operators shall be responsible for delivering mine cars to and from the miners' working places.

Only union-made explosives, mine supplies and tools shall be made available for use by the mine workers.

Mine workers shall not be required to pay for safety equipment and devices, including electric light and cap rentals. All day and monthly men shall be furnished necessary tools and equipment without charge.

There shall be no charge to the miners for blacksmithing.

The work week shall begin on Monday and shall be designated in the Agreement.

It will not be a violation of any terms of the Agreement for the mine workers to cease work to prevent shipment of coal to nonunion concerns or where a strike is in progress.

12. *District Conferences and Agreements.* Joint conferences of districts in the Appalachian Region shall be held concurrently with the Appalachian Conference. All other districts shall meet in joint conference after the Appalachian Agreement is negotiated for the purpose of negotiating district wage agreements pursuant to the basic agreement and this policy.

Wage-scale resolutions, affecting local working conditions and rules, shall be made a subject for consideration by all district joint conferences.

Districts shall not negotiate agreements which grant more favorable conditions to the Operators than obtain in the basic contract.

All supplemental agreements shall be approved by the International Union.

ANTHRACITE DEMANDS AS EMBODIED IN SCALE COMMITTEE'S REPORT UNANIMOUSLY ADOPTED AT THE DISTRICT CONVENTION, MARCH 5

The following proposals shall be submitted to the Anthracite Joint Wage Conference on behalf of the International Union, Districts 1, 7 and 9, United Mine Workers of America, and the local unions and members thereof:

1. The maximum hourly provisions of the joint agreement, including the supplemental agreement regarding the six-day week, be reaffirmed with the following modifications.

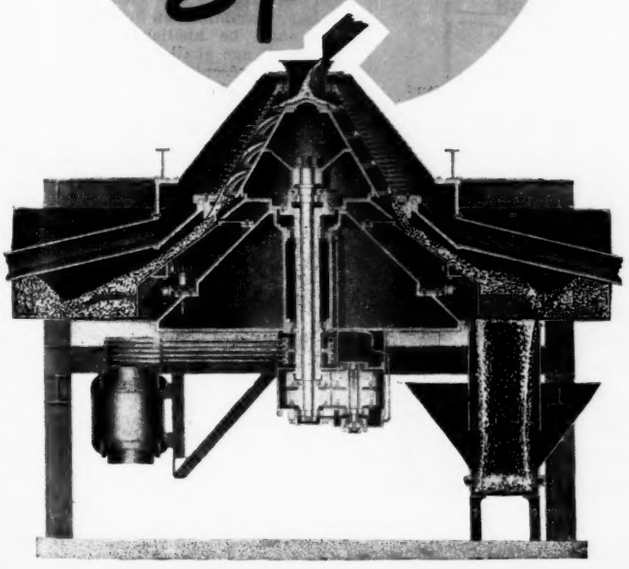
(a) That the present six-day week shall be eliminated when the war emergency ends;

(b) To conform with the basic and legal requirements for the industry the maximum hourly provisions of the agreement shall be amended to establish portal-to-portal for starting and quitting time for all underground workers with the stipulation that present conditions and standards as affect

MORE CARLOADS OF *finer* COAL SIZES SHIPPED QUICKER...

DEWATERS AND DRIES WITH *Speed*

"C-M-I" *Continuous Centrifugal* DRYER



★ Drying coal faster and uniformly speeds up coal deliveries. You secure increased tonnage and save waste.

The drying job is done so fully that you get no freezing of the coal in transit or in storage—the clogging of bins, spouts, and cars is eliminated. You save in installation space and in power.

Sludge and slurry coals are easily reclaimed and used for special purposes or mixed with larger sizes when you use the "C-M-I" Continuous Centrifugal Dryer.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

SECOND AND PRESIDENT STREETS ST. LOUIS, MO.

Crews get back to work quicker after blasting when *Genuine Flexipipe* ventilation clears away smoke and fumes. And they work better with fresh air Flexipiped to the face at which they are working. These are two reasons why *Genuine Flexipipe* steps up production.

Made of tough, specially woven and treated material, *Genuine Flexipipe* can take the hard knocks of every-day use. It is resistant to damage from gas, fungus growth, heat, acid and alkaline waters. *Genuine Flexipipe* comes in three grades.

Mail the coupon today for descriptive literature on *Genuine Flexipipe*.

EASY TO HANDLE! *Genuine Flexipipe* is easy to carry. 1000 feet, with blower equipment, can be loaded in one mine car.

EASY TO INSTALL! A thousand feet of *Genuine Flexipipe* has been installed in less than an hour.

FLEXIBLE INSTALLATION! *Genuine Flexipipe* can be threaded through narrow irregular passages without cutting ventilating efficiency.

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Genuine FLEXIPIPE

The Original Flexible Ventilating Tubing

BEMIS BRO. BAG CO., 403 a Poplar Street, St. Louis, Missouri

Please send literature on *Genuine Flexipipe*.

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*Company*_____

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*City*_____ *State*_____

COMING MEETINGS

- American Mining Congress: May 17 and 18, Cincinnati, Ohio.
- American Wood Preservers' Association: annual meeting, April 27, Palmer House, Chicago.
- Mine Inspectors' Institute of America: annual convention, May 24 and 25, Desh-ler-Wallick Hotel, Columbus, Ohio.
- Illinois Mining Institute: 25th annual boat trip and summer meeting, June 4-6, from St. Louis, Mo.
- Smoke Prevention Association of America, Inc.: annual meeting, June 8-11, William Penn Hotel, Pittsburgh, Pa.
- Rocky Mountain Coal Mining Institute: annual meeting, Cosmopolitan Hotel, Denver, Colo., June 24-26.

ing contract miners and their laborers shall not be changed thereby;

(c) Time and one-half shall be paid for overtime after 35 hours; double time for Sundays.

2. The basic minimum rate of $5.08 per shift shall be increased $2 per shift; this basic increase of $2 per shift shall also be applied on the hourly, daily or monthly rates of outside and inside company men on the basis of a seven-hour day; the same relative increases in percentage shall be applied on all contract rates. Where tonnage rates are paid, same shall be on the basis of the legal ton of 2,000 lb.

Premium payments shall be made to all employees and rates for the second and third shifts.

Where a runaway coal condition prevails in any working place or places, proper rates shall be applied to compensate the miners for all coal loaded from such places on the basis of what would be paid on yardage, or such other method of payment in effect under normal conditions.

3. The minimum shift rate for any classification shall not be less than the present $5.08 minimum plus the increase thereon requested in Paragraph 2.

4. Proper qualified seniority shall be applied as affecting the men in the industry so that discrimination in layoffs or promotions shall be abolished. Suspension on account of age shall be prohibited.

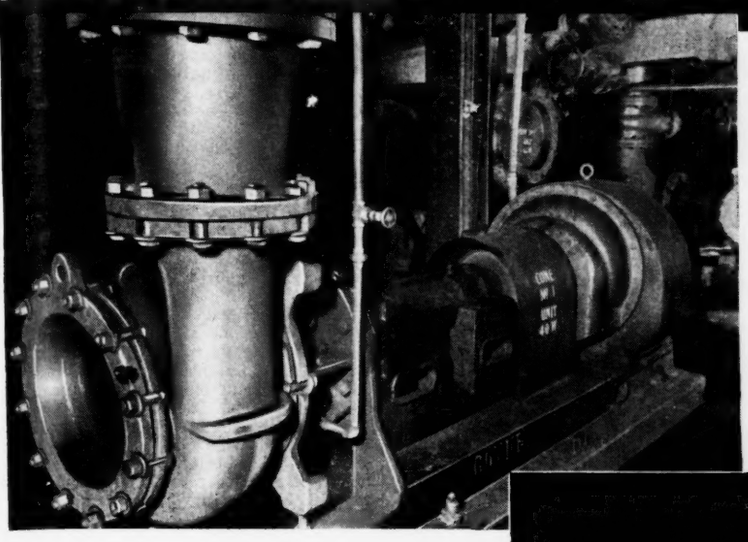
5. The present agreement provides in principle for the abolition of the individual and special contracts system. In some sections of the region there seems to be a dispute as to the application of this principle. In order to clear the matter up definitely we reiterate the demand that the joint conference should arrange for implementation of this principle so that the purpose and intent of the contract shall be carried out and such individual and special contract system be abolished without question. Granting of leases for the same purpose should be similarly treated.

6. Many resolutions indicate that men engaged in continuous shift operations should have their working time rearranged so that four six-hour shifts would be worked with the men receiving the same wages for the six-hour shift as they now receive for seven hours plus application of the overtime provision for the sixth and seventh day, plus the increase requested in Paragraph 2 hereof.

7. Abolition of the system of replacing employees with monthly men or bosses during idle time at the colliery.

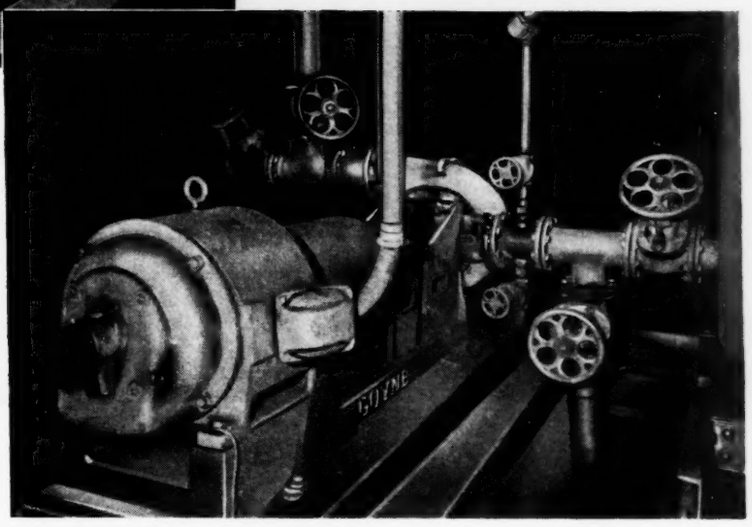
8. Elimination of certain existing practices wherein charges are made for air and safety appliances, electric lamps and safety clothing. Prices of powder and mine supplies shall be made uniform and not above wholesale costs. Union-made powder, supplies and tools shall be furnished to employees in the industry.

GOYNE PUMPS



Chance Cones in Consolidation Coal Company's new 7600 ton coal cleaning plant at Jenkins, Kentucky, are served by two Goyne 1500 G.P.M. SAND PUMPS and two Goyne 3300 G.P.M. RECIRCULATING WATER PUMPS.

In designing and building the ultra modern plant at Jenkins, Ky., for Consolidation Coal Co., Fairmont Machinery Co. specified a GOYNE 450 gpm pump driven by a 60 hp motor to pump sludge to a remote abandoned section of the mine . . . Consolidation's maintenance Supt. reports, "no trouble at all with our Goyne Pumps."



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Centrifugal Process Pumps
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Plunger Mine Pumps
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Standard and special Pipe and Fittings of acid resisting bronze or cast iron, wood or cement lined protection.

Built to Maintain Rated Capacity . . . While all pumps wear in use, Goyne pumps incorporate an external adjustment which controls clearance between impeller and wearing ring. This adjustment can quickly be made while the pump is in operation and enables you to maintain full pump capacity by preventing internal by-passing of water.

Easy Renewal of Parts . . . Inspection or renewal of impeller, casing wearing ring and shaft sleeve, which are internal parts of Goyne Pumps for this type of service, are quickly made by removal of casing cap and without disturbing suction or discharge connections. Bearings are of rugged roller types encased in oil sealed housing.

Any Head—Any Capacity . . . Goyne builds sizes and patterns to meet practically any requirement in coal cleaning plants or the pumping of solids in suspension. Locations and arrangements for attaching both suction and discharge pipe are according to your specifications.

Write us today for comprehensive Bulletin No. 1609.

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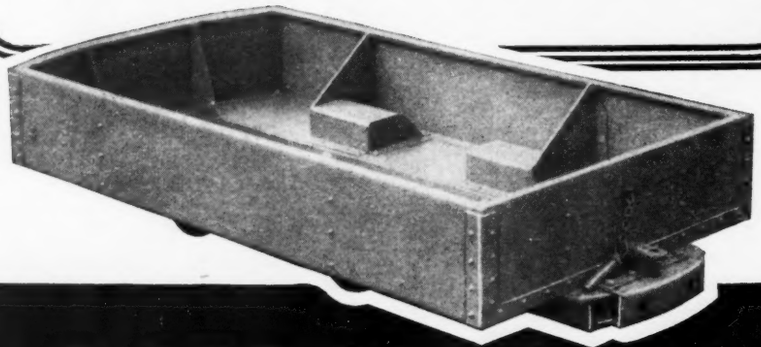
Phillips

MODERN STEEL MINE CARS



A CAR DESIGNED AND BUILT TO STAND ABUSE!

A rugged individualist—this Phillips Steel Mine Car!

Simplicity in design . . . all steel construction . . . properly welded and riveted. Write for the Phillips interesting proposal.

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Order by catalog number—save time and effort. Superior Catalog No. 7 shows number of brushes required, brush size, materials used, name plate data for machines on which brushes are used. Among types of equipment covered are coal drills and loaders, motors and generators, locomotives, mine rotaries, welders. . . . Superior Carbon Brushes embody 24 years' specialization . . . of painstaking attention to detail.

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Since 1919 SUPERIOR CARBON BRUSHES

9. Abolition of physical examinations in the hiring and rehiring of employees.

10. Establishment of a uniform rock-work scale. Such work shall not be let to contractors, but shall be performed by the usual rock men, the same as coal is mined, at regular rock rates.

11. Abolish courthouse dockage systems and all other penalizing dockage agreements.

12. Employees engaged in repair work, or at a work similar in kind and character to that of mechanics, shall be paid for such work on the basis of the proper classification for skilled or semi-skilled work, said rate to skilled tradesmen to be the standard rate for that particular class of work performed; and for a semi-skilled or helper work, a rate shall be paid substantially above the minimum rate, which we suggest should be at least 10 cents per hour above the minimum. A uniform standard rate shall be established for mechanics.

13. Inclusion of all employees in the industry and its related processes under the terms of the general agreement, except those in such specific employment as may require exclusion under Federal law.

14. Mine committees or other officers of the organization shall have the right to original jurisdiction in grievances and shall be permitted to raise such grievances when or where necessary.

15. When men report for work on their respective shifts and are unable to start work due to failure of the company to provide timber, supplies, cars, etc., such employees shall be compensated for one shift at their respective rates for such days when they are denied work for the above reasons.

16. A uniform price for coal sold to employees at less than the going circular price.

17. Mine workers shall be accorded a two weeks' vacation with pay each year on the basis of miners' pay to miners, consideration rate to contract workers and the established rates in effect to all other classifications, with a more liberal basis for the computation of vacation payments to be worked out in the agreement.

18. A uniform consideration rate for consideration miners and laborers shall be established. We suggest that this uniform rate be established on the basis of the present consideration rate now being paid in many sections of the region to men working on that basis—which is usually under abnormal conditions—the miner's rate now being $7.43 plus, with the increase to be added thereon as requested in Paragraph 2 hereof, with a proportionate rate to consideration miner's laborers.

19. All day work and contract rates shall be brought up to date, and all supplemental agreements shall be recorded therein. Where supplemental agreements have been made which lower former standards, through which the work is more burdensome and earnings less, such agreements

Bureau of Mines Approvals

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in January and February, as follows:

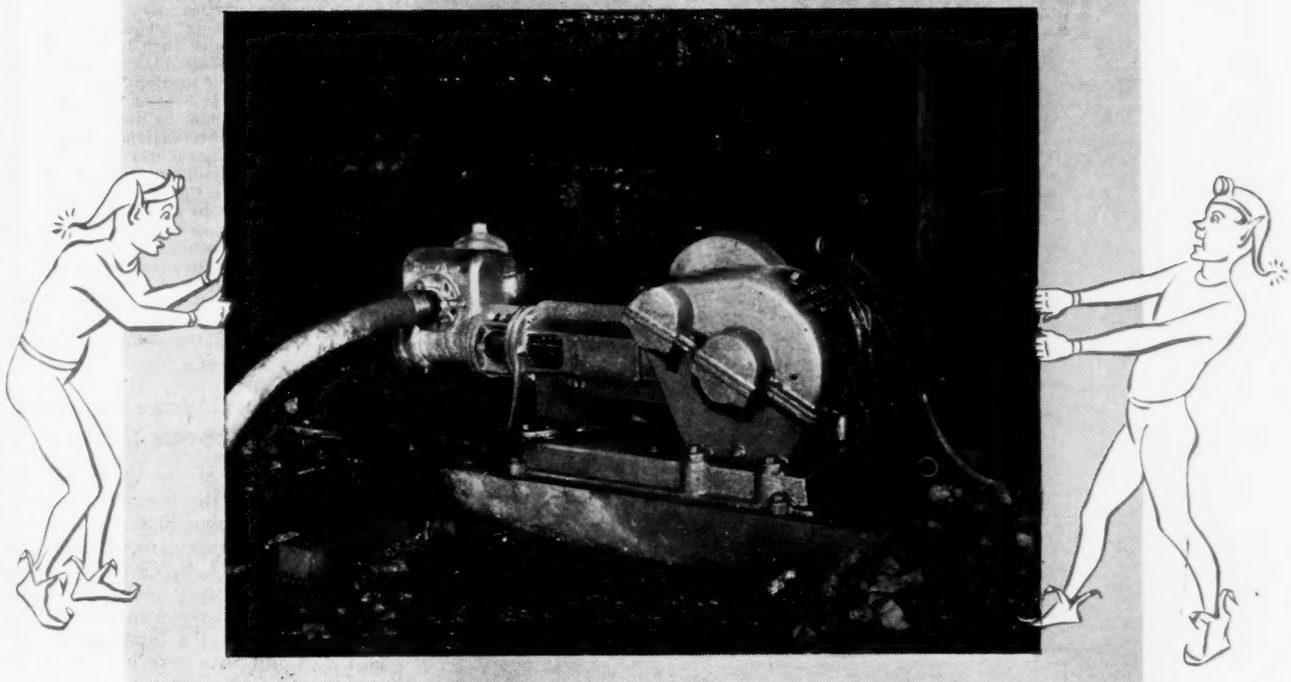
Goodman Mfg. Co.—Type 93-CO4C storage-battery locomotive; Approval 1532, Jan. 30.

Chicago Pneumatic Tool Co.—Type 580 post drill; 5½-hp. motor, 250 and 500 volts, d.c.; Approvals 471 and 471A; Feb. 8.

Goodman Mfg. Co.—Types G-15 and GS-15 shaker conveyars; 15-hp. motor, 250 and 550 volts, d.c.; Approvals 472 and 472A; Feb. 11.

Goodman Mfg. Co.—Types G-20 and GS-20 shaker conveyors; 20-hp. motor, 250 and 550 volts, d.c.; Approvals 473 and 473A; Feb. 13.

"Back and Forth" Save Pumping Costs



B-F "AUSTIN-BROWNIE" Pump on a Gathering Job

BACK: "Why does a B & F pump work best on gathering?"

FORTH: "Because it's based on the good old Back & Forth principle—a *reciprocating* pump—that gives slower movement, less wear, fewer breakdowns and—steady, high capacity."

BACK: "But that's not all—"

FORTH: "You *said* it—working out of a shallow sump, it gives steady service—no loss of prime, and the pump resists corrosion from sulphur water and wear from grit."

BACK: "O.K.—but let B. & F. tell the rest of it to Coal Mine Men."

B-F "AUSTIN-BROWNIE" Mine Gathering Pumps

One reason for the long life of the AUSTIN-BROWNIE Pump is the construction of the "Back-and-Forth" members.

have been giving outstanding performance for more than 25 years. For high heads and all kinds of severe gathering service the AUSTIN-BROWNIE Pump is the logical choice. Enclosed, self oiling power frame—heavydrop forged crank shaft—malleable iron "I" section connecting rod—marine type adjustable crank pin bearing—box type crosshead with adjustable shoes—special shock absorbing water cylinder—these all add up to low cost, dependable operation.

AUSTIN-BROWNIE Pumps are available in capacities up to 100 g.p.m., and for heads up to 250 feet. Water ends are of cast iron, bronze or chrome. Standard or permissible electrical equipment.

Write for full engineering data and prices.

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BLOWERS	CAR SPOTTERS
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"It's a FIST-GRIP on Hitler's Throat... Saving Fighting Metal, Speeding the Job..."

"Yes, we use Laughlin 'Fist-Grip' Safety Clips," says this Super. "Three of them do the work of four U-bolts, and they don't crimp and injure wire rope that we want to re-use."

Another says: "The 'finger-pinch' U-bolt clip wastes rope and clips. This 'Fist-Grip' Clip will help choke Hitler by saving time and metals."

These 3 Savings on the Job Mean More Guns, More Bullets

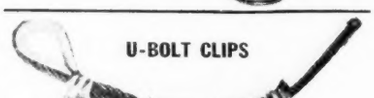
Saves Accidents — can't be put on wrong even by inexperienced men; doesn't weaken rope; greater holding power.

Saves Metals — 25% fewer clips do the job better, saving steel; no crushed rope ends; flush nuts — no battered threads.

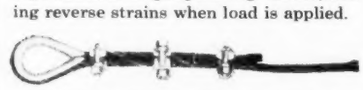
Saves Time — fewer clips needed; nuts on opposite sides tighten easier, faster with any type wrench.

Greater holding power with 25% fewer clips

Distributed Through Mill Supply Houses
Look for Laughlin Products in Coal Mining Catalogs



Unavoidably crimp, distort and bow wire rope with this "finger-pinching" action, causing reverse strains when load is applied.



LAUGHLIN "FIST-GRIP" SAFETY CLIPS

Hold rope in smooth, vise-like grip, with no reverse bends under load and no protruding threads to become battered and spoiled.

THE THOMAS LAUGHLIN *Company*
PORTLAND, MAINE

shall be abolished and former standards and practices restored.

20. The agreement shall be a period of one year with the following modification:

(a) That during the contract period either party, through representatives designated by the parties, may terminate the agreement by giving 30 days' notice in writing in advance of such termination.

21. We recommend that a new section be written in lieu of Section 9 of the present agreement, and that Section 6 of the Agreement of May 7, 1936, be amended so as to conform to the International Constitution of the United Mine Workers of America; with the understanding that in districts where the District Constitution provides a grant of authority to the particular district to collect limited assessments, such shall be permissible only when approved by the International Executive Board. Where local unions request limited assessments for special local purposes, said collections shall be permissible only when approved by the District and International Executive Boards.

•

Portal-to-Portal Wage Payments Upheld by Appeals Court

A 1941 ruling of the Wage and Hour Division that in the future it would enforce the Fair Labor Standards Act on a portal-to-portal basis in metal mining was upheld by the U. S. Court of Appeals for the Fifth Circuit (New Orleans) in a decision handed down in March affirming a decision of the Northern Alabama District Court in a case brought by the steel companies of that State seeking a declaratory judgment to the effect that they were not liable for payments for time other than that worked at the face prior to the date of the Wage and Hour Division's ruling. The miners filed counter suits seeking back pay, liquidated damages and attorney's fees back to the effective date of the act. The Wage and Hour Division intervened in support of the miners and the court ruled against the steel companies. This ruling was upheld by the Appeals Court.

•

Class I Railroads Install New Cars and Locomotives

Class I railroads put 1,683 new freight cars in service in January, according to the Association of American Railroads. This compares with 8,143 put in service in the corresponding month last year. Cars installed in the first month of this year included 620 hopper, 584 gondola, 370 flat, 65 automobile box, 17 plain box and 27 miscellaneous freight cars.

These roads also put 49 new locomotives in service in January, of which 44 were steam and 5 were electric and diesel. New locomotives installed in January, 1942, totaled 71, of which 26 were steam and 45 were electric and diesel.

New freight cars on order by the roads on Feb. 1 totaled 19,281, against 68,070 on order on the corresponding date a year earlier. New cars on order this year included 9,342 hopper, 7,955 gondolas, 1,774 flat, 67 plain box cars and 143 miscellaneous freight cars. They also had 471 new locomotives on order this year, compared with 543 on the similar date in 1942. Those on order this year included 335 steam and 136 electric and diesel, contrasted with 249 steam and 294 electric and diesel a year ago.

A.M.C. Conference Program Nears Completion

The program for the 20th annual convention of the American Mining Congress—designated this year as a coal-mine war conference—to be held May 17 and 18 at the Netherland Plaza Hotel, Cincinnati, is nearing completion. Sessions on deep mining will be held in the morning and afternoon of each day, with special separate sessions in the afternoons devoted to strip mining.

George F. Campbell, vice president and general manager, Old Ben Coal Corp., national chairman of the conference, is being assisted by the following State chairmen: Pennsylvania—C. J. Potter, Rochester & Pittsburgh Coal Co.; Ohio—James Hyslop, Hanna Coal Co.; Indiana—B. H. Schull, Binkley Mining Co.; Illinois—Wm. P. Young, Bell & Zoller Coal & Mining Co.; West Virginia—G. J. Stollings, Mallory Coal Co.; eastern Kentucky - Virginia - Tennessee—George Pow, Elk Horn Coal Corp.; Rocky Mountain—D. H. Pape, Sheridan-Wyoming Coal Co., Alabama—I. W. Rouzer, Alabama Mining Institute; western Kentucky—Sterling S. Lanier Jr., Norton Coal Mining Co.; stripping—H. A. Reid, United Electric Coal Cos.

District meetings of the program committee were held late in February at Lexington, Ky.; Birmingham, Ala.; Charleston, W. Va.; Pittsburgh, Pa.; Chicago and Evansville, Ind., at which consideration was given to such vital phases of war-time mining for discussion as manpower, material conservation, management, mechanization, coal preparation, maintenance and safety.

•

Urges Semi-Annual Inspection Of Small Hard-Coal Mines

A bill before the Legislature of Pennsylvania proposing safety inspections at least once every six months of smaller anthracite operations as a means of reducing mining fatalities has the indorsement of the State Department of Mines. The measure, introduced by Representatives Harry P. O'Neill (D., Lackawanna) and John Mock (R., Luzerne), provides that State safety and health inspections, now limited to operations employing more than five persons, would be required in mines having two to five employees.

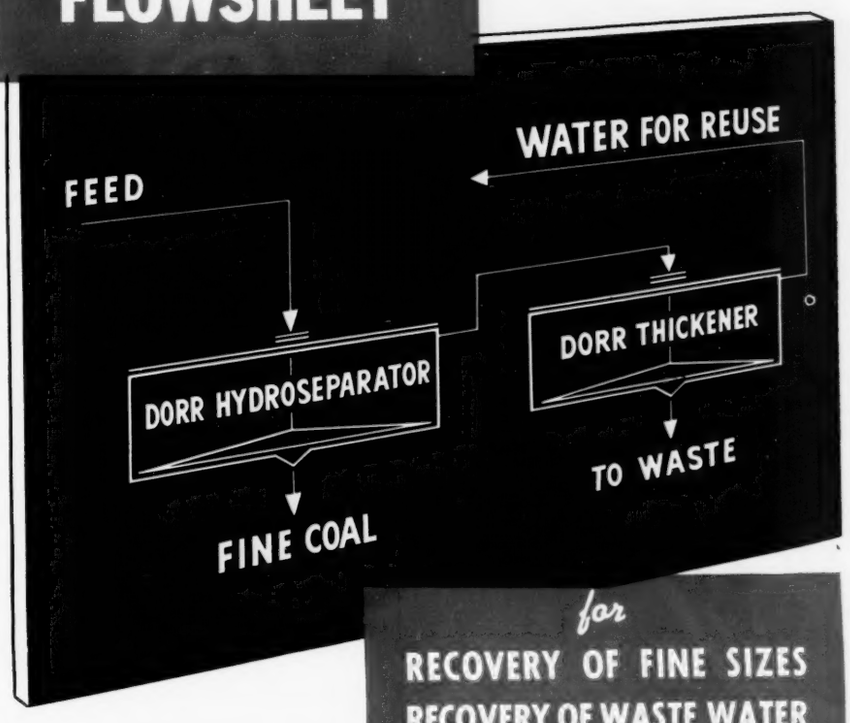
Fatalities in bootleg mines in 1940, said Mr. Maize, totaled 72; in 1941, 61; and in 1942, 45; production was about 6,000,000, 6,000,000 and 3,900,000 tons, respectively.

•

Reopen Chandler Mine

Because of wartime pressure for fuel, the Chandler mine of the Victor-American Fuel Co., Chandler, Colo., is scheduled to resume production some time this month. The mine was temporarily closed last summer while development work was carried on by three shifts to reach a new lower seam.

DOUBLE DUTY FLOWSHEET



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RECOVERY OF WASTE WATER

Recovery of fine sizes and of waste water for reuse plus the elimination of your stream pollution problem can be simply and economically effected by the flowsheet above employing Dorr equipment. Here are the results obtained by one coal producer—with a Dorr Hydroseparator, a Dorr Thickener and this same flowsheet.

Slush from the cleaning system containing 22% ash was fed to the Hydroseparator at the rate of 45 tons per hour. It produced an underflow containing 13.2% ash at the rate of 16 tons per hour—a product suitable for blending and sale. 29 tons per hour of Hydroseparator overflow containing 24% ash was fed to the Thickener which overflowed a clear water for reuse. Salable fine coal... clear water for reuse... the automatic elimination of stream pollution ...all were accomplished in these two Dorr units.

This is but one of the many combinations possible with Dorr equipment. Why not have a Dorr engineer size up the situation in your own plant?

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WARSAW, INDIANA

Manpower Problem Grows More Critical; Union Drive for Foremen Unsuccessful

WHILE manpower continued as a major coal-mining problem in March, agitation for a "National Service Act" increased and the War Manpower Commission and other government agencies addressed more attention to the problem of absenteeism. The question of unionizing foremen came in for congressional attention as a result of efforts to get such men to sign up in coal mining and other industries.

Attempts by the United Mine Workers to sign up foremen, bosses and other previously exempt employees up to the grade of superintendent apparently made no progress. A telegraphic survey by *Coal Age* on March 22 could be summed up by stating that the number of foremen or bosses applying for union membership was practically nil.

Attempts to unionize foremen in coal and other industries apparently stirred up considerable reaction in Washington and in fact resulted in at least two bills, one specifically forbidding attempts at recruiting by various unions, as well as any other union rule or practice which "interferes with the full utilization of the nation's manpower in the present war." This bill followed wires from the president of General Motors to several members of Congress that efforts were being made to organize his company's foremen into the Foremen's Association of America and a move by the National Labor Relations Board toward an investigation into whether this union should be recognized.

Bills Ban Unionizing Foremen

Offered by Representative Smith, Virginia, March 18, the bill (H. R. 2239, referred to the Military Affairs Committee) would amend the Selective Service Act to forbid the adoption or continuance of any union rule or practice hampering the war effort by preventing full manpower utilization. Also it would make any executive, administrative, professional or supervisory employee of any war contractor or firm engaged in war work ineligible for membership "in any labor organization engaged in collective bargaining;" exempt such contractor from any obligation to engage in collective bargaining with an organization admitting such employees to membership; and forbid coercion by such union organizations. Earlier in the month, Representative Smith also offered H.R. 1996, amending Sec. 2, Par. 3, National Labor Relations Act, to remove supervisory employees from the jurisdiction of the act by adding the proviso: "or any individual employed in a bona fide executive, administrative, professional or supervisory capacity."

Hearings on H. R. 2239 started March 25 before the House Military Affairs Committee. After Representative Smith had briefly described his bill, J. D. Battle, executive secretary, National Coal Association, appeared as the next witness. Explaining that for 50 years supervisory employees, by mutual consent, had been excluded from the contract in coal mining, Mr. Battle stated that such inclusion would weaken management's authority and result in inefficiency in mine operation and loss of coal production. Substantially the same points were made by former Senator Edward R. Burke, president, Southern Coal Producers' Association; Heath S. Clark, president, Rochester & Pittsburgh Coal Co., speaking for both his company and the Appalachian Joint Wage Conference, northern section; and Walter Gordon Merritt, general counsel, Anthracite Institute. Both Messrs. Clark and Merritt appeared March 26. Plans also were made to hear a number of witnesses representing the manufacturing industries.

Despite its action in the Union Collieries Co. case (R-3464), in which it found certain supervisory employees an appropriate bargaining unit, the National Labor Relations Board apparently seemed unsure of its course in March. This conclusion could be inferred from the board's announcement March 23 that the question of whether foremen are to be treated as employees under the National Labor Relations Act would be the subject of a public hearing April 6. The proceedings were to be conducted on three petitions filed by unions of foremen employed by the Boeing Aircraft Co., Seattle.

While continuing their opposition to unionization of foremen on economic and managerial and well as safety grounds, in which they were joined by a number of public anc State bodies, coal operators in March pressed applications to the Treasury Department for permission to raise the pay of supervisors commensurate with the longer work week.

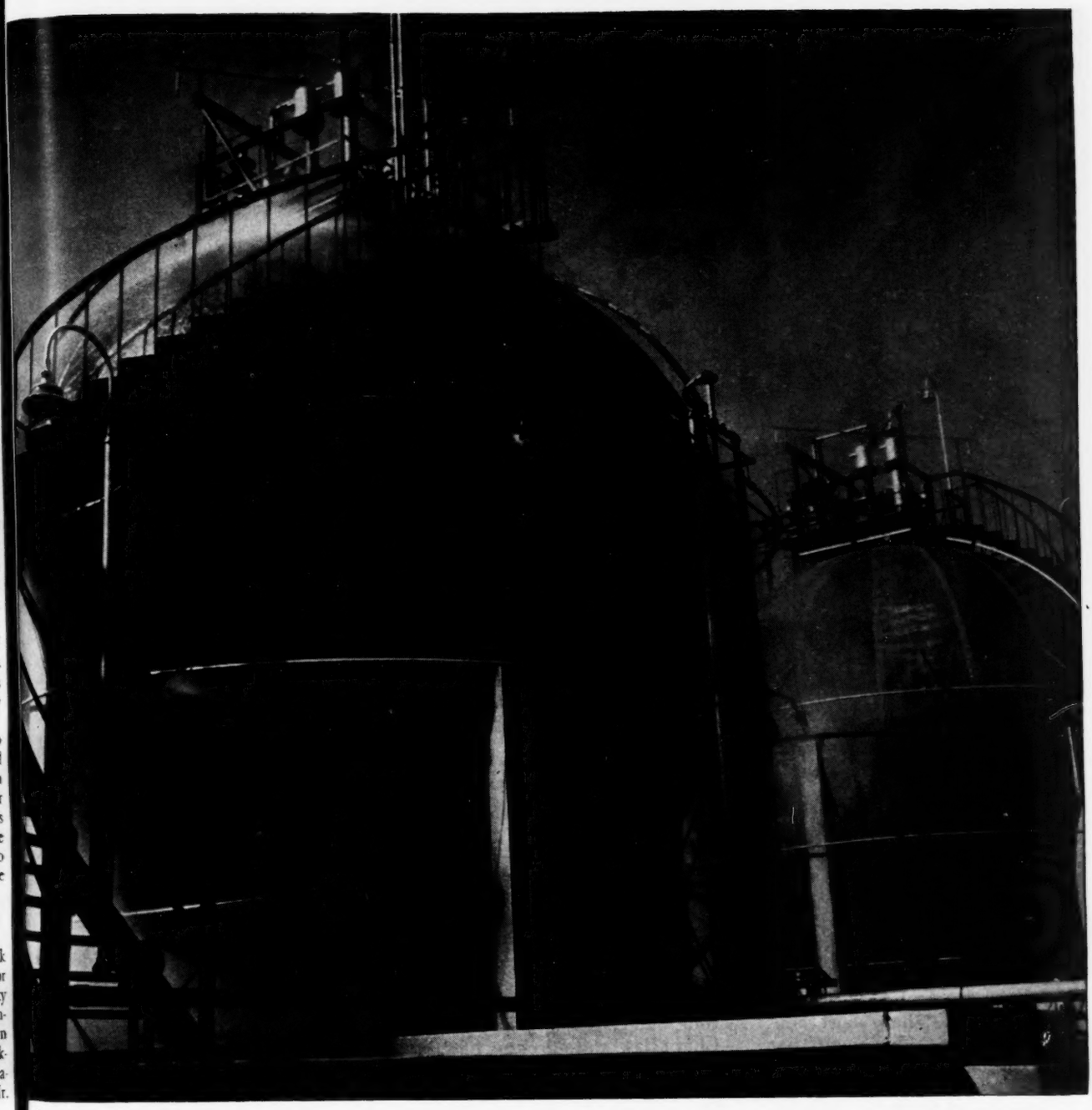
Manpower Story to Byrnes

The story of coal's manpower outlook was taken to James F. Byrnes, Director of Economic Stabilization, in his capacity as chairman of a special Presidential committee created to study and report on the manpower situation, by C. C. Dickinson, president, National Coal Association, early in March. The text of Mr. Dickinson's telegram follows:

"This message deals with the manpower situation in the bituminous coal-mining industry of the United States, and as president of the National Coal Association, representing coal producers throughout the entire nation, we feel it our duty to lay before you our views and conclusions, which grew out of a meeting of the board of directors of this association last Friday, the 5th.

"It is not necessary to emphasize the necessity for a continuation of the coal production on its present basis. Five hundred and eighty million tons was produced last year, which was 66,000,000 tons over 1941, and the industry is informed by government officials that requirements for this year will be over 600,000,000 tons.

"It is estimated that some 60,000 to 70,000 workers have left the coal-mining industry since the war began, either to go into the armed services or into other



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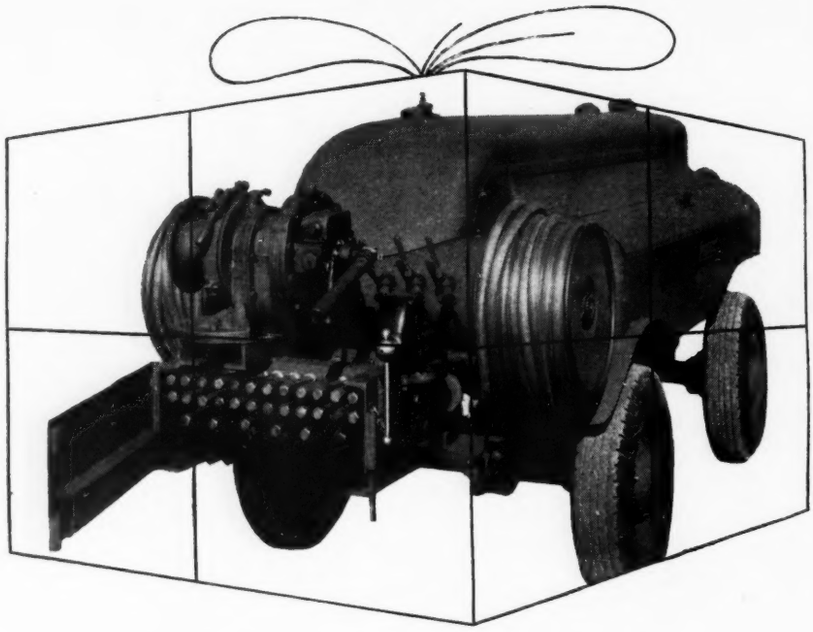

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industries. Every possible effort has been made by management to carry on in the face of this loss by employing every person any way near capable of working in the mines, and we have reached that point where any further reduction in the working forces will simply mean that enough coal will not be produced to meet the needs of the nation.

"The mining of coal today is wholly different from what it was some years ago in that a vast number of mines are highly mechanized and it necessarily requires considerable training of men to fill the various jobs incident to coal production. Just as our modern bomber requires an exact number of men each trained in his own work, so the mining machine today requires an exact number, and the loss of one man makes the operation of the machine impossible, with resultant loss of production.

Skill a Factor Now

"It is no longer just a question of a person with sufficient knowledge to handle a pick and shovel but of a person with knowledge sufficient to safeguard his and the lives of others, and many states have laws that require a certificate before any person can work in a mine, that certificate being evidence of experience and capability, said experience being gained by serving as an apprentice. Moreover, men who are over 40 years of age are reluctant to accept employment in mines and our efforts to induce them to accept such employment have on the whole been very unsuccessful.

"It is the hope and desire of the management of the bituminous coal mines of this country to continue to serve this nation, with a full realization that any failure to produce the coal required will hamper the war effort, and thus we feel it our duty to the country to say that immediate steps should be taken to prevent further taking of men from the mines.

"The Secretary of the Interior, who also is Solid Fuels Coordinator, is thoroughly familiar with this whole problem and, we understand, has discussed the matter with other government officials. The government could render a real service if your committee and other high government officials spoke out plainly with respect to the importance of coal production with a special plea to the workers to eliminate absenteeism.

"There are, of course, other important considerations, such as securing the necessary equipment and supplies to keep the mines in operation, as well as sufficient transportation to move the coal, but, we understand, your special task is to look into the manpower situation. Therefore we ask that mine labor be not further taken for the armed services or be permitted to be taken for other industries solely on the ground that further loss will make it impossible to meet the requirements for coal already announced by those in authority in government. The consideration of your committee in this matter is earnestly solicited."

On other fronts, March brought strong support for a "National Service Act" from the War Department and

other governmental agencies, with a number of Congressmen indorsing the principle. Labor leaders, however, were largely in the opposition camp. Most of the activity centered around the Austin-Wadsworth bill for compulsory control of manpower.

The growing factor of absenteeism was the subject of much Congressional debate also, and a number of bills were offered to remedy the situation. The War Manpower Commission also took a hand with an announcement early in March that it and the War Production Board were preparing a comprehensive plan as a guide for labor, management, communities and governmental agencies. No details were released, however.

In the field of Selective Service, a new procedure was adopted permitting appeals from classifications to be transferred to the State in which the registrant is working, even though it is far removed from his local board area. The new system, Selective Service explained, was adopted with the idea that appeals boards where men are employed have a better knowledge of working conditions, labor supply and the desirability of keeping men on the job.

Sign to Work Six Days

Additional coal-mining districts signing agreements for six-day operation in late February and early March included Michigan, Indiana, Kansas, Missouri and Oklahoma. On March 3, the DeBardeleben Coal Corp., operating four mines in Alabama, signed a six-day agreement also.

One of the outstanding strikes of recent months came to an end March 1 when miners at the Montour No. 4 property of the Pittsburgh Coal Co. ended their walkout in protest against the company's request for deferment of a young, unmarried loading-machine operator. However, the men made the proviso that they would continue work only if the man in question, Walter Chaffon, was inducted. Chaffon cut the Gordian knot March 3 by quitting to enter the army "or take anything else that comes along," thus averting threats of a resumption of the strike.

A ban on smoking precipitated a walkout at Mine No. 214, Consolidation Coal Co., Jenkins, Ky., late in February. In March, 700 miners of the C. H. Mead Coal Co., East Gulf, W. Va., struck for unknown reasons, according to union officials. In Illinois, miners at the St. Louis & O'Fallon Coal Co. resumed work late in February after a stoppage beginning Feb. 9.

Strikes in the anthracite region in March included a walkout of 250 miners at the Salem Hill colliery, Salem Hill Coal Co., over a time-and-a-half pay dispute concerning a previous Saturday's work, and a strike of 1,100 men March 19 at the No. 6 colliery, Susquehanna Collieries Co., with seniority as the principal announced cause. The stoppage ended March 22.

After the National Labor Relations Board had overruled its regional director on the question of "void" ballots, certificates of a shop union for the Exeter shops of the Glen Alden Coal Co., West

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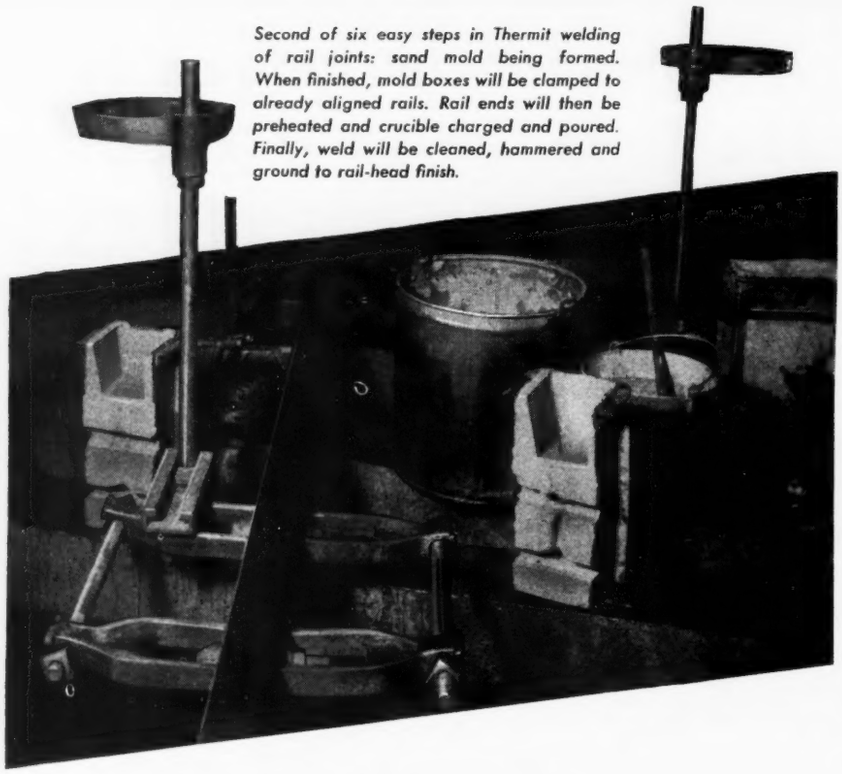

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Pittston, Pa., was denied by the Board. After stating that the void ballots should be recognized as an expression of opinion by men voting, the Board ruled that the men did not desire representation by either the United Mine Workers or the International Association of Machinists (AFL).

Canada continued to press for return of soldiers to coal-mining jobs, although there was a brief flare-up over charges published in one army paper that men were unable to make as much money at coal mining as at soldiering. However, this apparently was only a minor incident, as later reports told of preparations to grant leave to 50 men immediately and 175 men eventually from army units in British Columbia for coal-mining work.

Other measures to relieve the man power shortage included introduction of a bill in the British Columbia Provincial Legislature to permit women over 18 years old to work in surface jobs. Another bill introduced in the same body would permit the employment in a coal mine as manager, overman, shiftboss, fire boss, shotlighter or miner "a person who is not registered as a holder of a certificate of competency or service under the Coal Mine Regulation Act." This pro vision is to extend only for the period of the war. Any uncertificated person employed must, in the opinion of the chief inspector of mines, be competent to carry on the work to which he is assigned.

Canada also experienced a number of "quickie" strikes in both the eastern and western fields in March, but they all were soon over. The butter ration became a point of issue in Nova Scotia, along with other food supplies, although dissatisfaction did not reach the stage of a walk out. Dominion officials, however, were unable to promise any increase in but ter quantities, but did make arrangements for more meats and bacon.

•

Anthracite Advisory Board Personnel Changed

Meeting in New York City late in February, Pennsylvania anthracite operators made a few changes in the Producers' Advisory Board, which administers the production plan. Robert L. Birtley was elected a principal, vice Caleb Kenney, resigned. William Jones was named an alternate to James H. Pierce, replacing Mr. Birtley. Bruce Payne was elected an alternate to W. M. Burrus, succeeding Earl Lamb, resigned.

•

Association Activities

Illinois Coal Strippers' Association at its annual meeting elected as president Frank F. Kolbe, president, United Electric Coal Cos., vice A. H. Truax, president, Truax-Traer Coal Co. Charles H. Hightower, sales manager, Central State Collieries, Inc., was named treasurer; James W. Bristow, secretary; and Harold M. Hicks, Midwest-Radiant Corp., vice president.

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Ickes Suggested as Solid-Fuels Administrator; Pressure to Build Up Supplies Continued

WITH pressure still continuing for building up supplies of both coal and fuel oil, especially in the East, March was marked by a report that Secretary of the Interior Ickes might be appointed "Solid Fuels Administrator," with powers over solid-fuel distribution similar to those he now exercises in connection with oil as Petroleum Administrator. An executive order to that effect has been drafted, it was reported, following recommendations by the National Advisory Solid Fuels War Council and the National Retail Solid Fuels War Council.

Fuel oil continued short in the East in March, although with the ending of cold weather the situation from the consumption standpoint eased somewhat. Anthracite also continued in short supply, and deliveries were delayed in some instances, although there were no cases of acute and long-continued shortages. To ease the oil situation, however, manufacturers using fuel oil to develop electric power were prohibited from using oil after April 5 where it was possible for them to obtain power from coal or hydro plants. And in the case of coal, consumers converting to that fuel were urged first to make sure of their supplies before installing conversion equipment. Thus, said Hobart H. Littell, liaison representative of Gen. Brice P. Disque, Assistant Deputy Solid Fuels Coordinator, it would be possible to avoid the mistake of installing equipment which would leave little flexibility or choice in the type of coal that might be used.

The bituminous supply situation also showed an improvement in March, although there were a few reports of shortage in railroad cars for loading at the mines. Adequate supplies were available in most consuming centers, even in such formerly critical ones as Utah, where investigation showed that fears of a shortage had been overcome.

Stockpiling Urged

Notwithstanding the improved situation, however, sentiment grew in March for a 1943 stocking campaign to add substantially to reserves against the next winter season and provide a cushion against future war demands. Coal, it was held, should, if possible, add materially to reserves, while pressure was continued for increasing the flow of oil to the East not only to meet possible war and civilian demands but also to build up present critically low stocks.

Evidence also indicated even greater pressure on domestic and industrial conversion in the coming months. To aid the change to coal, OPA offered a new certificate of purchase to facilitate stove installation. Easing of restrictions on stokers also resulted in an upturn in the installation of this equipment. The Dickson Coal Co., Inc., New York City, as a result, started the distribution of a limited number of Model C 21-in. open-hopper spill-over-type "D & E automatic anthracite burners" with capacities of 25 to 60 tons of No. 1 buckwheat annually. Orders must be approved by WPB field offices.

The University of Illinois called attention to "the first major improvement in hand-fired fuel burning for home heating since Benjamin Franklin invented the stove in 1740." Termed the "down draft burner" and developed by Prof. Julian R. Fellowes, the improvement has been incorporated into two devices, "one a contender for the 'furnace of the future.' The other is a conversion unit which can be placed in almost any present furnace to give it the down-draft advantages, which include more even heat. Neither has any moving parts. Both will be available to the general public after the war."

An increase of approximately 60 percent in oil shipments to the East next winter was forecast by Mr. Ickes in March, although he held out little hope of relaxation of oil restrictions in the meantime. Most of the new flow will be the result of construction of new pipelines now shortening the tanker run and eventually to reach to the East Coast. Flow from Texas to Norris City, Ill., it was reported, is now exceeding the ability of tank cars to move it on East, and experiments were being conducted on the use of specially equipped box and gondola cars as supplementary oil carriers. Meantime, work on the eastern extension of the Texas-Norris City line was being rushed. Construction also was begun on the new 20-in. "products" line from Texas to Seymour, Ind., and an application was in for material to extend this line to the East Coast also. A third line, furthermore, was "quite within the realm of probability," according to an opinion expressed by Mr. Ickes March 20. As stated, however, there was no let up in pressure for conversion.

Canada also pressed measures for building up stocks this summer and strengthened its control over fuels distribution. Canadian authorities also announced that to prevent a possible wood-fuel famine a subsidy of $1 a cord would be paid on wood fuel contracted for and cut before June 30, and also that the early-buying credit plan for fuel purchases would be adopted again this year. Jurisdiction over the production and supply of coal, coke and wood fuel was placed in the hands of an Industries Control Board, the Department of Munitions and Supply announced in March. A new coal control is created to assume the duties, powers and functions of the old Coal Administration, including operation of the Dominion Fuel Board, which was absorbed by the Coal Administration in 1941. Rationing of oil was hinted for the coming fall as pressure for conversion continued.

Revised Bill to Extend Coal Act Introduced Additional Maximum Prices Announced

SUPPORTED by the Coal Producers' Committee and including certain amendments to the House measure offered by Representative Doughton, a Senate bill to amend and extend the Bituminous Coal Act of 1937 was introduced March 5 by Senator Truman. The Truman version (S. 822) is understood to have the approval of the Department of the Interior.

In addition to the Doughton provisions for, among other things, preliminary or temporary orders pending final disposition of petitions for redetermining costs and increases or decreases in minimum prices, the Truman bill provides for interim price increases and decreases to meet charges in labor rates, periodic publication of cost and realization statistics and new rights of appeal to the courts. The amendments were the net result of a boiling-down process at a meeting of operators favoring extension of the act in late February.

As compared with the Doughton bill (February *Coal Age*, p. 128), the Truman bill incorporates the following additional provisions:

"The Bituminous Coal Division shall within 90 days following the expiration of each calendar month compile information to the end and with the result that within 90 days following the close of each calendar month the district boards shall be apprised of the total weighted average costs of each district and of the total weighted average realization at minimum prices of each district for each calendar month. In addition to the figures of total costs and minimum price realization compiled as provided hereinabove, the Bituminous Coal Division shall within 120 days following the expiration of the last month of each quarter of the calendar year compile and publish information so as to disclose for each district the total and average per net ton minimum price realization of all coals by each size group and use classification shipped into each applicable market area with the total and average per net ton amount of discounts or price allowances made to distributors thereon"—amendment to Sec. 4 II (a), Act of 1937.

"Pending final disposition of any petition by a district board or the Consumers' Counsel or of a proceeding instituted by the Bituminous Coal Division on its own motion for such a redetermination of costs and increase or decrease of minimum prices and upon reasonable showing of the propriety thereof under the provisions of this Act, the Bituminous Coal Division shall make such preliminary or temporary order as in its judgment may be appropriate: *Provided, that within 30 days after due notice of the initiation of any such proceedings in accordance with such rules and regulations as it may prescribe, the Bituminous Coal Division shall issue such interim order, as may be appropriate, increasing or decreasing minimum prices to the extent necessary to reflect clearly demonstrated changes in cost, established as a result of changes*

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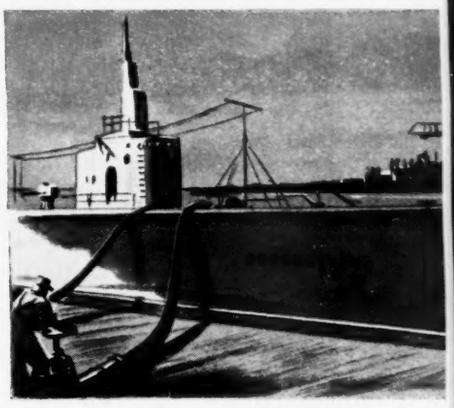
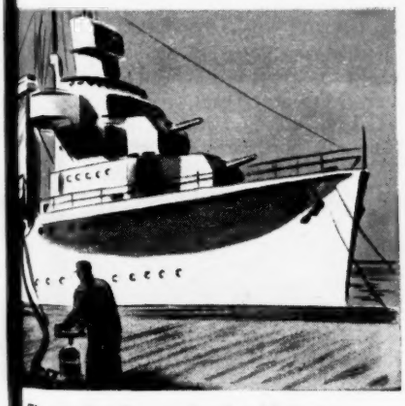


Submarines require acid-resisting rubber for battery compartments; other kinds of rubber in gaskets, mountings, and for scores of special applications.



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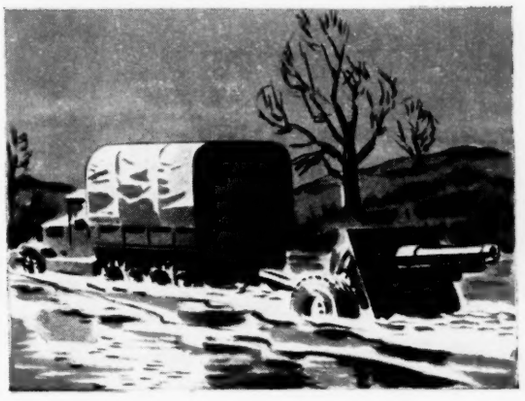

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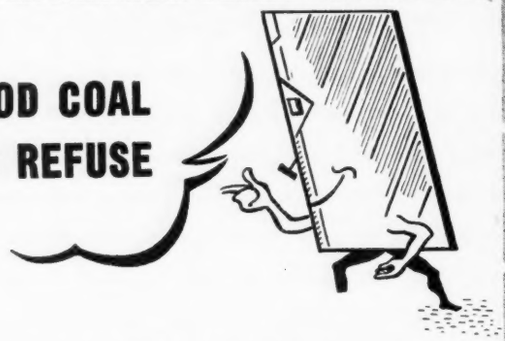

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in costs of labor as evidenced by authenticated copies of contracts between the producers and the employees or their respective representatives"—amendment to Sec. 4 II (a); new matter in the Truman bill shown in *italics*.

"Sec. 6 (b) of the Act is amended (a) by inserting in the first line of the first paragraph after the word 'person' a comma and the words 'including any district board'; (b) by inserting in the ninth line of the first paragraph after the word 'served' the words 'upon all parties to the proceeding in which the order complained of was entered and'; (c) by striking out in the eighteenth line of the first paragraph the words 'either party' and inserting in lieu thereof the words "any party to the court proceeding'."

Indications toward the end of March were that the House Ways and Means Committee would begin hearings late in that month or early in April. In addition to the Doughton proposals this committee also had in its hands the Guffey-Jenkins bill proposing, among other things, a return to a "Bituminous Coal Commission." As time wore on, however, there was evident some growth in sentiment for an extension of the act with no changes, if that would help to get it through before the deadline of April 25.

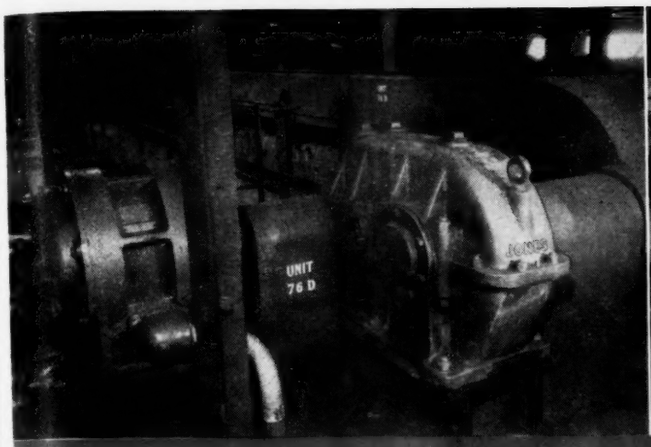
Hearings in Docket A-1737, the cost redetermination proceeding growing out of a petition by Boards 7 and 8 for an increase in minimum prices (February *Coal Age*, p. 130), were postponed in March from March 24 to April 15.

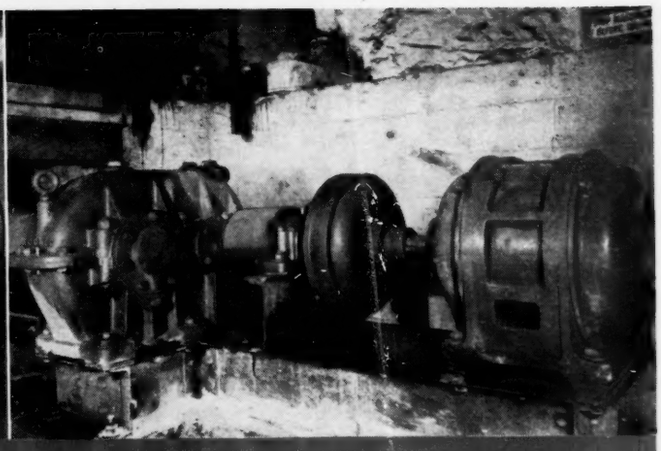
Increases in maximum bituminous coal prices had been granted five more districts in addition to those listed in the March *Coal Age*, p. 109, up to the time this issue was closed. The districts and increases were: No. 5 (Michigan), 40¢ per ton; No. 11 (Indiana), 20¢; No. 15 (Kansas, Missouri, Texas, part of Oklahoma), 15¢; No. 17 (western and southern Colorado, northeastern New Mexico), 31.8¢. These increases covered both increased labor costs growing out of adoption of the six-day week and increases in costs of materials and supplies. Districts in which action has not yet been taken were: No. 12 (Iowa), No. 13 (Alabama) and No. 16 (northern Colorado).

To cover increased operational costs, maximum prices on lake shipments of anthracite and bituminous coal moving to certain parts of Lakes Superior and Michigan were raised March 19 by OPA. Maximums are computed for 1943 on the basis of the highest offering price for a like sale for delivery during Dec. 15-31, 1941, plus the following:

For bituminous coal prepared at the dock as double-screened or lump sizes: from mines in Districts 1, 2, 3, 4 or 6, 55¢; District 7 or 8, low-volatile, $1.10; Districts 4 or 8, high-volatile, 80¢; other sizes, "the increase in the supplier's maximum price for each size of coal over the weighted average price charged the dealer for the same fuel received via water transportation facilities during 1942."

Anthracite increases were: egg, stove and nut, 55¢ per ton; pea, 50¢; buckwheat and rice, 45¢; barley, 35¢; smaller sizes, 30¢.

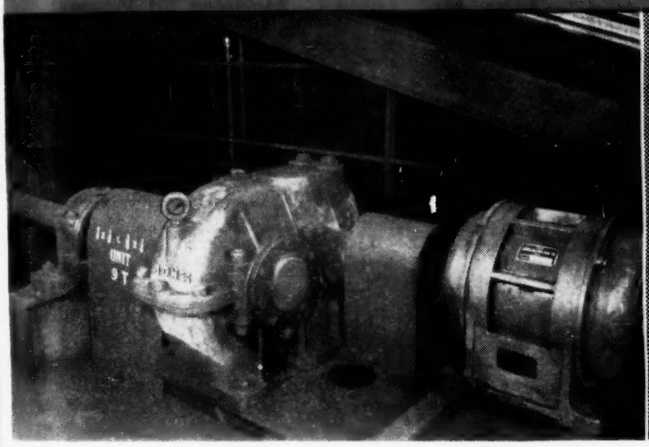




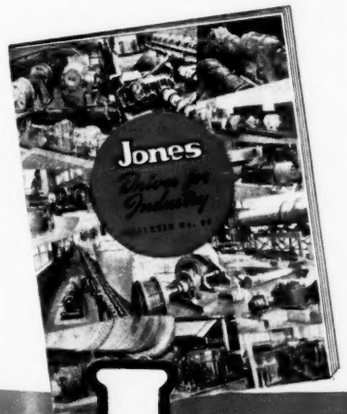
• Jones herringbone reducer driving a raw coal flight conveyor to the vibrators at the new Jenkins, Ky. preparation plant of the Consolidation Coal Co.

• For driving the conveyor to the stoker blending hopper a Jones 20.8:1 herringbone speed reducer is used.

• Each trip maker is protected from shock by a hydraulic coupling which is located between the motor and the Jones herringbone speed reducer.



JONES DRIVES help speed the wartime fuel supply



THE problem of greater coal production with a constantly dwindling man power supply calls for the most careful scrutiny of every detail of operating procedure. Thus the drives for belt and scraper conveyors, bucket elevators, feeders, railroad car dumps, loading booms, skip hoists and similar services can't just be taken for granted in wartime. Drives must be selected that will stand up under the severe punishment of present day production schedules.

Jones Drives for the coal industry have measured up in every way to this standard. That is why, on property after property, Jones speed reducers and other transmission products have again and again been selected for each expansion program.

The illustrations shown here are of drives located at the new Consolidation Coal Company's preparation plant at Jenkins, Kentucky. In this plant some 25 Jones herringbone speed reducers are now in service.

If you would like to have a condensed picture of the Jones products and engineering service, that are being widely used by the coal industry, just ask for Bulletin No. 80, "Jones Drives for Industry".

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
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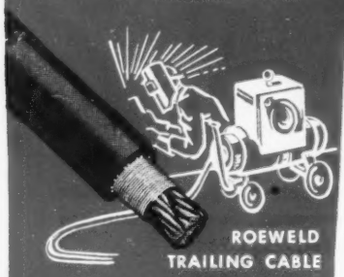
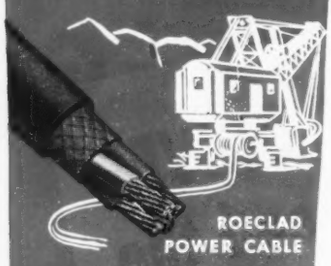
ROEBLING

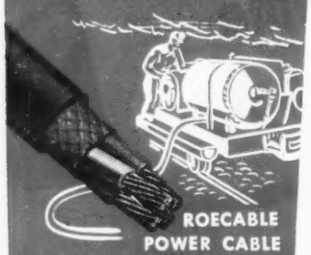
Portable CORDS and CABLES



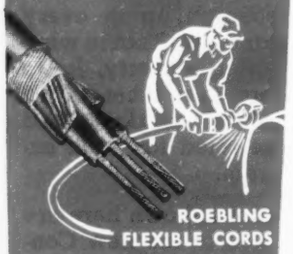
ROEWELD TRAILING CABLE



ROECLAD POWER CABLE



ROECABLE POWER CABLE



ROEBLING FLEXIBLE CORDS

ROESHEATH PARKWAY CABLE

TOUGH? you Bet! but Uncle Sam says...

"TREAT 'EM CAREFULLY!"

1 REPAIR DAMAGES PROMPTLY

To repair a bruised cable jacket, cut away damaged insulation and taper or "pencil" back on each side to four or five times the thickness of insulation. Clean and apply insulating cement to taper and conductor. Wrap splicing tape to same thickness as original jacket. Patch vulcanize—but if this is not practical, apply tape to 2 inches beyond repair and finish as for splice, as explained below.

2 PIECE TOGETHER SHORT LENGTHS

To splice short cable lengths, cut back jacket and insulation from each end. Clean and splice the conductors. Taper or "pencil" back as for repair, to four or five times insulation thickness. Wrap splicing tape to same thickness as original jacket if patch vulcanizing is possible. If not apply friction tape overall, half-lapped to 2 inches beyond splice and finish with a waterproof paint.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY — Branches and Warehouses in Principal Cities

Louis C. Madeira 3d

Louis C. Madeira 3d Passes: Anthracite Institute Head

Louis C. Madeira, 3d, 51, executive director of the Anthracite Institute, New York City, for the last nine years, died March 20 in Doctors Hospital of uremia after a long illness. He had resigned his directorship five days previous because of ill health.

Mr. Madeira entered the coal business 30 years ago in his father's firm, Madeira, Hill & Co., working in every capacity from actual digging of coal through mine foreman, superintendent, manager and, finally, vice-president. His experience also included distribution, transportation and public relations. He resigned from Madeira, Hill & Co. in 1934 to join the Anthracite Institute, which he helped organize.

ANDREW WALLACE DUNCAN, 63, of Greenville, Ky., executive of the W. G. Duncan Coal Co. for many years, died March 11 at the Norton Memorial Hospital, Louisville, Ky., where he had been a patient since March 3. The company, which was one of the largest and oldest in western Kentucky, leased its plant several years ago to the western Kentucky division of the Kentucky Utilities Co.

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Personal Notes

A POSITION IS OPEN on the editorial staff of COAL AGE. Correspondence is invited from mining engineers or other engineers with coal-mining experience and with some facility in the use of the English language. Complete personal details, including salary level and selective service status, should be submitted with letter of application. Address COAL AGE for further information.

L. G. BALL, president of J. H. Weaver & Co., Philadelphia, has been elected to the board of directors, vice J. F. Macklin, resigned.

CEILING UNLIMITED!

For higher production levels change to PRECISION LUBRICATION!

There may be a ceiling on prices. But when it comes to production—it's *ceiling unlimited!*

Faced with a shortage of man-power, and with the highest quotas in history—mining operators are working their equipment harder and longer than ever before. The result is that, today, the hazard of machine breakdown is increased a hundredfold.

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Whether your work calls for one or several types of lubricants—Cities Service is ready to serve you with correct, top-quality products and expert engineering counsel.

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Loader Greases	Cable Compounds
Compressor Oils	Gear Lubricants
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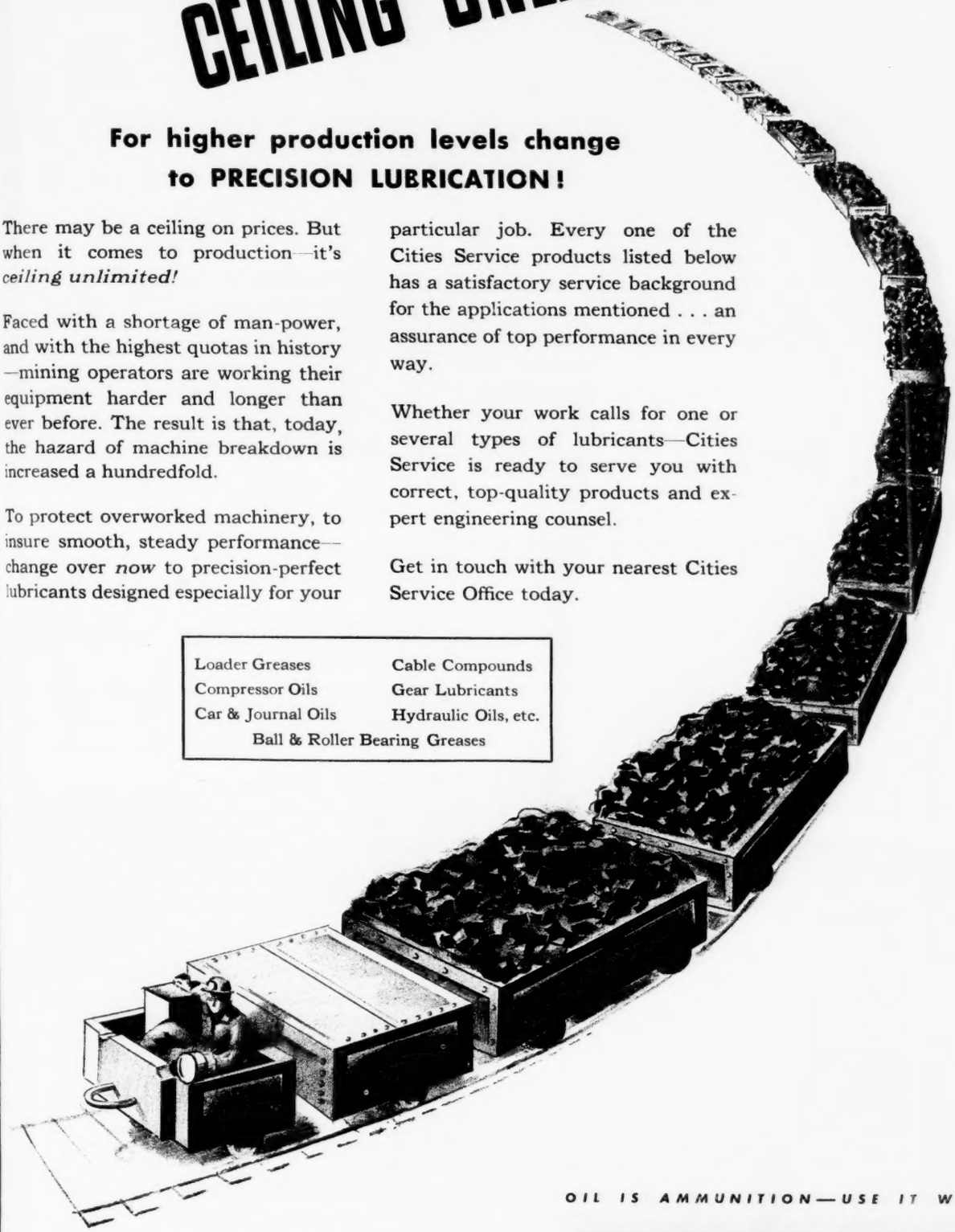
Ball & Roller Bearing Greases



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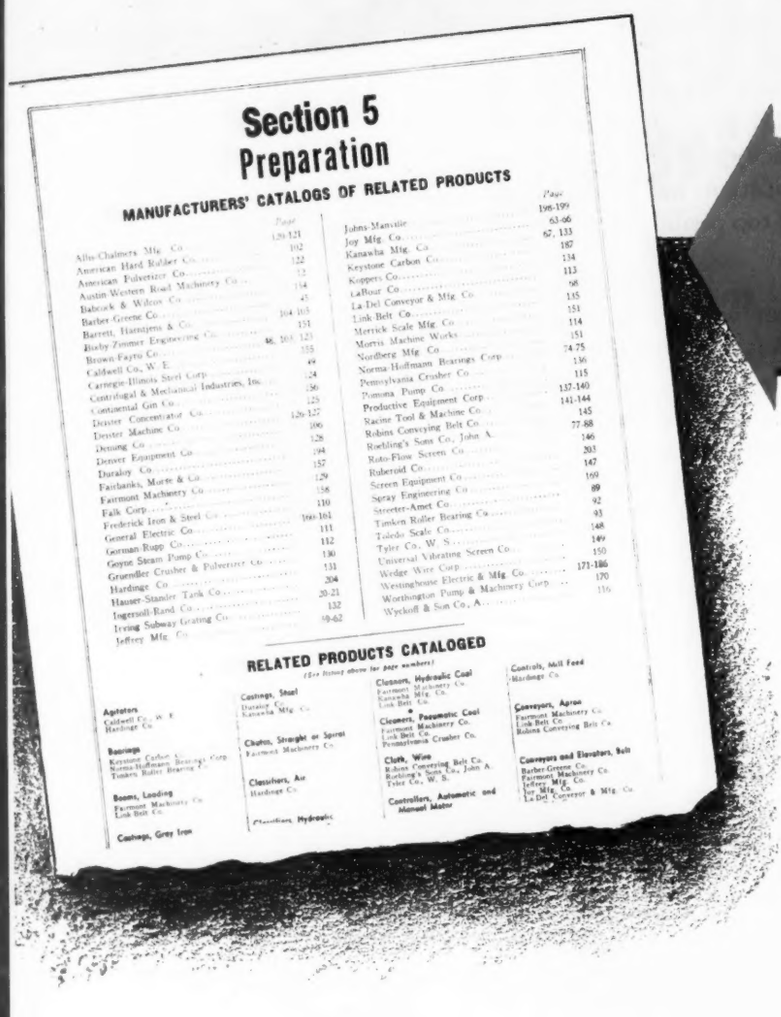

TURN TO PAGE 118 OF YOUR COAL MINING CATALOGS FOR THIS INDEX

—one of seven sections in this handy, useful catalog.

These COAL MINING CATALOGS features speed your specifying, requisitioning, and buying . . .

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- **CLASSIFIED DIRECTORY of Manufacturers listing all principal manufacturers of coal mining machinery, equipment and supplies, indispensably classified by product for quick reference!**

Today, where every minute saved means increased coal tonnage for essential war effort, you'll find COAL MINING CATALOGS more helpful and useful than ever before in your specifying, requisitioning and buying. In improved sectionalized form, with the latest catalog data from manufacturers, this 1942 edition is one catalog you'll keep right at your elbow for daily, speedy reference.

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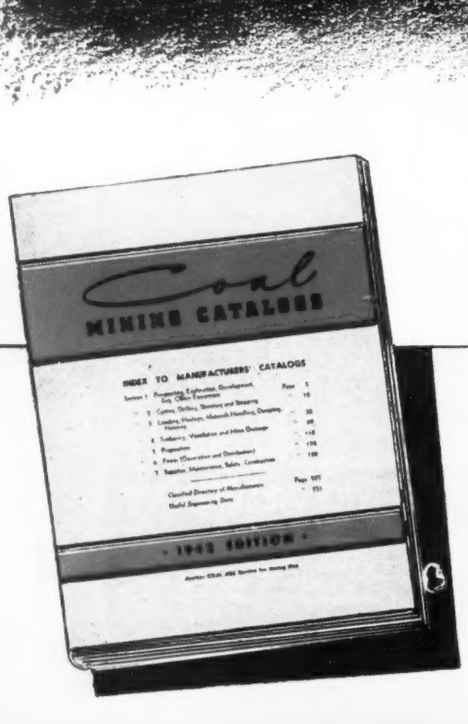


COAL MINING CATALOGS, 330 West 42nd St., New York, N. Y. C.A., April, '4

Gentlemen: I am responsible for specifying, requisitioning, or buying equipment and supplies needed at our property, and do not have access to COAL MINING CATALOGS. Please forward me a copy of the 1942 Edition immediately. (If my country imposes duty on such Catalog books, I agree to pay same.)

Name ..... *Title* .....

Company Name .....

Address .....

The nature of our operation is .....

O. S. Batten, formerly connected with the Blue Diamond Coal Co. in the Harlan field of eastern Kentucky, has been named consulting engineer with the Utilities Elkhorn Coal Co., Esco, Ky., in the Big Sandy field.

Jack Bullington has been promoted from chief electrician to pit superintendent of the Fiatt mine, Truax-Traer Coal Co., Canton, Ill.

Hodge Burras, formerly mine foreman for the Union Pacific Coal Co. at Rock Springs, Wyo., has been promoted to superintendent of the company's Hanna mines, Hanna, Wyo.

Tom Childers, mine foreman for the Consolidation Coal Co., McRoberts, Ky., has resigned to become a foreman for the West Virginia Coal & Coke Corp., Omar, W. Va.

James H. Claggett, lately connected with coal concerns in Illinois, has been named preparation manager of the Utilities Elkhorn Coal Co., Esco, Ky.

Jim Cowan, formerly employed by the Calumet Fuel Co. at Somerset, Colo., has been made mine foreman at the Tony Bear mine, Paonia, Colo.

John L. Coyer, formerly with the Eastern Coal Corp., Stone, Ky., has been appointed safety engineer in the Kentucky Department of Mines. For several years he was connected with the Fordson Coal Co. operations in Pike County, Kentucky.

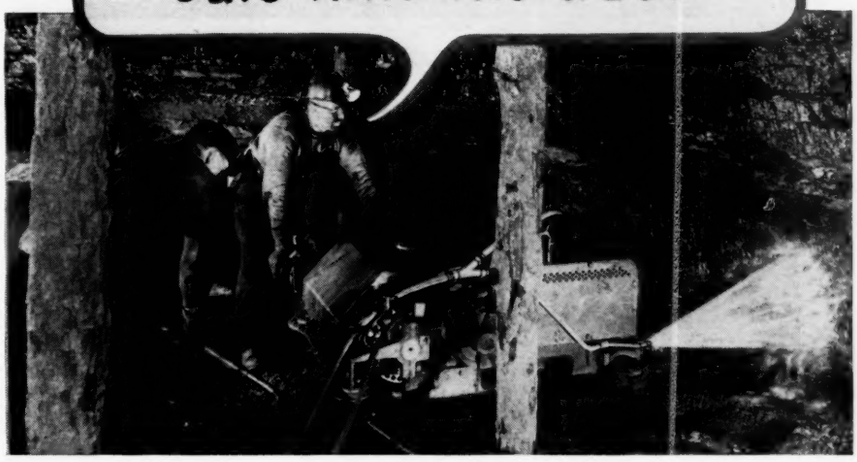
Roy Crawford, Whitesburg, Ky., has been named engineer for the Elkhorn Jr. Coal Co., Millstone, Ky. He also is connected with several other coal companies in the Whitesburg area.

Lamar Epperly, for several years president and general manager of the Winding Gulf Collieries, Bluefield, W. Va., has announced his retirement from those positions. He retains his financial interest in the company, however, and continues to serve as a director.

Richard H. Dalrymple, chief State coal mine inspector for Utah until a short time ago, has been named by Governor Herbert B. Maw to be a member of the State Industrial Commission. His special concern as a commissioner will be general supervision of safety activities in mines and industry.

Frank W. Earnest Jr., president of Anthracite Industries, Inc., since its organization in 1936, was elected executive director of the Anthracite Institute, New York City, on March 15, succeeding Louis C. Madeira 3d, who resigned that day and died five days later. Mr. Earnest will continue as president of Anthracite Industries, with which the Anthracite Institute will be merged, the offices of both organizations to occupy joint space in the Architects Building, 101 Park Ave., New York City, beginning May 1. Before becoming president of Anthracite Industries Mr. Earnest was vice president of the Spencer Heater Co. H. R. Stanton has been named secretary-treasurer of the Anthracite Institute.

"That COMPOUND-M sure kills the dust"



YES-COMPOUND-M does kill coal dust

And at a cost of about ½ cent per ton mined

COMPOUND-M, as received at the mines, in concentrated form is not expensive. As used, it is diluted from 600 to 1000 times. The equipment necessary to outfit the mine is not expensive either and most mines have the materials in their stores. If they must buy some equipment, it gets a very high priority.

It's just good business to protect men, property and production against hazards of dust concentration. COMPOUND-M provides the cheapest insurance.

We have a competent representative in your territory. Why not have him make a study of your mine and recommend a suitable COMPOUND-M treatment.

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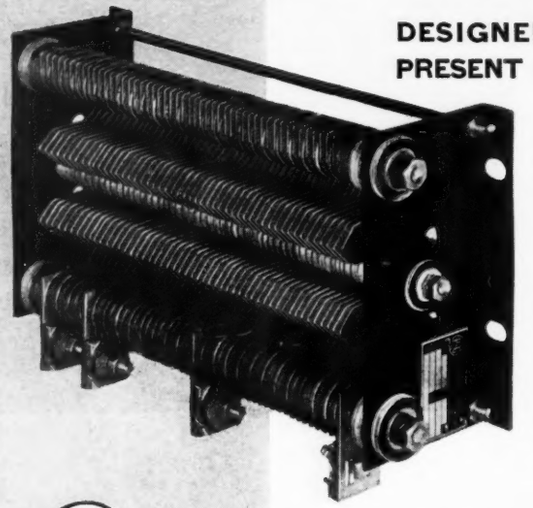
CONSISTENTLY PROVE THEIR VALUE
for **MINING MACHINES**



DESIGNED TO FIT YOUR PRESENT RESISTOR SPACE

Built of steel and mica—nothing to break—no warping or hot spots—constant in resistance value, regardless of temperature or age. Not affected by vibration, moisture or corrosive fumes. Continuous trouble-free service is assured with . . .

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● **MESCO INSULATOR SWITCHES, constructed of high quality bronze, combine ruggedness of design with precision. They are built for greater safety and longer service.**

Knife edge approach affords smooth trolley under-run. The switch blades are easily reversed from right to left hand, and are swiveled on an insulated hinge, assuring non-conductivity regardless of current direction. MESCO switches are available in all sizes and types for use with any trolley wire and feeder cable in combinations. Write for complete information.

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1115 Arlington Avenue Pittsburgh, Pa.

Frank W. Earnest Jr.

C. R. ENGLISH has been appointed general manager of the Pacific Coast Co. (with mines in Washington), Pacific Coast Coal Co. and Pacific Coast Cement Co. with the title of vice president and general manager. E. W. MAXWELL has been made assistant vice president of the Pacific Coast Co. and vice president of the Pacific Coast Coal Co. and Pacific Coast Cement Co.

LYMAN FEARNE, who several years ago served as chief inspector of mines of Wyoming, has been employed as assistant safety engineer by the Union Pacific Coal Co., Rock Springs, Wyo.

JOHN FARLEY FOSTER, former research chemist for the General Electric Co., Pittsfield, Mass., has been appointed to the research staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to its division of fuels research. He is engaged in research on the development of improved methods for the manufacture of gas from coal.

HAROLD GREER, mine foreman for the West Virginia Coal & Coke Corp., Omar, W. Va., has resigned to become mine foreman for the Consolidation Coal Co., Jenkins, Ky., with which he formerly was connected for many years.

DANIEL L. HENLEY has been appointed tipple foreman at Maitland mine of the Koppers Coal Division, Eastern Gas & Fuel Associates, Maitland, W. Va., vice R. V. WHITE, transferred to Carswell mine, Kimball, W. Va. Mr. Henley formerly was outside foreman for the Brule Smokeless Coal Co. at Otsego, W. Va.

LLOYD W. INGLES, superintendent at Kebler No. 2 mine of the Colorado Fuel & Iron Corp., Tioga, Colo., has been transferred to the company's Crested Butte mine in the same capacity.

BURKE JOHNSON, formerly superintendent, Willabet mine, Leckie Fire Creek Coal Co., Fireco, W. Va., has been transferred to Aflex, Ky., as superintendent of Freeburn mine of the Leckie Collieries Co.

G. GRIFFITH JOHNSON has been appointed chief of the Solid Fuels Branch of the Office of Price Administration's

Fuels Division, vice GERALD B. GOULD, resigned. Mr. Johnson previously served as assistant to the chief of the Fuel Division and prior to that was chief of the Steel Section of OPA.

G. O. LIVELY has returned to the Raleigh-Wyoming Mining Co., Beckley, W. Va., as assistant to L. T. Putman, vice president in charge of operations. Mr. Lively had been with the Rochester & Pittsburgh Coal Co., Indiana, Pa., for two years.

ELMER MARTIN has been appointed chief electrician for the Fiatt mine of Truax-Traer Coal Co., Canton, Ill.

ALEX U. MILLER, Vincennes, Ind., has been named special assistant to the Solid Fuels Coordinator for War at Washington to handle problems relating to production, transportation and distribution of coal. He has been with the U. S. Bureau of Mines since 1917. Recently he has headed the Bureau's Health and Safety service for Virginia, southern West Virginia and eastern Kentucky.

G. E. MINNS, formerly superintendent, Leckie Collieries Co., Aflex, Ky., has been appointed superintendent of the Wyoming mine, Wyoming Mining Corp., Oceana, W. Va.

H. D. PINKNEY, hitherto superintendent at Crested Butte mine of the Colorado Fuel & Iron Corp., has been transferred to the Morley mine in the same capacity.

OTTO G. SHARRER, formerly superintendent at the Hanna (Wyo.) mines of the Union Pacific Coal Co., has been transferred to the Rock Springs general office as assistant general superintendent.

RUSH THOMAS has been named tipple foreman for the Utilities Elkhorn Coal Co., Esco, Ky. He formerly was connected with operations in the main Elkhorn field.

C. KYLE TIECH, formerly superintendent of the Monarch mine of the Blue Diamond Coal Co., St. Charles, Va., has become general manager of the Benedict Coal Corp., St. Charles.

WALTER R. UNSELL has been advanced from general superintendent and mining engineer to secretary and general manager of the Blue Bird Coal Co., Carrier Mills, Ill.

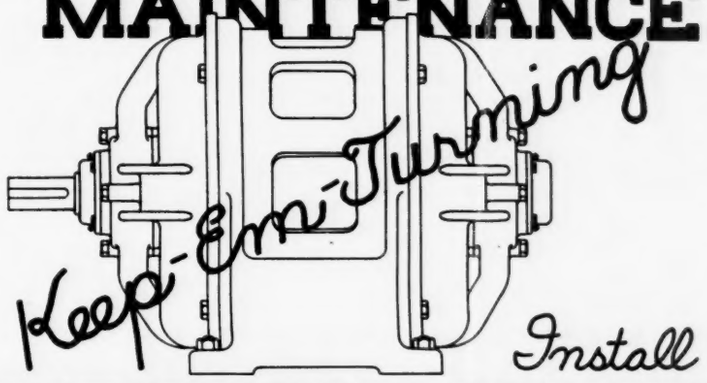
ANDREW WILSON, safety engineer for the Pennsylvania Coal Co., Scranton, Pa., with which he has been associated for the last 17 years, has been appointed a State mine inspector.

•

Fire Destroys Columbine Tipple

Fire destroyed the headframe and tipple at the Columbine mine of the Rocky Mountain Fuel Co., Erie, Colo., on March 12. The fire started about 6 a.m. and lasted five hours, causing practically a total loss of the two structures, according to Harry M. Jones, an official of the company.

BETTER **MOTOR MAINTENANCE**



Install

KEYSTONE BALL BEARING END BELLS

HOW SLEEVE BEARINGS CAN CAUSE FAILURES

(1) Sleeves wear, allowing rotor to rub stator.

(2) Oil collects on coils and in air ducts, causing dirt to adhere which restricts or stops ventilation.

(3) Oil vapor condenses on coils causing insulation rot.

(4) Bearings require frequent inspection to determine oil level and bearing wear.

HOW BALL BEARINGS CAN PREVENT THESE FAILURES

(1) Ball bearings will usually far outlive sleeve bearings. Bearings will rarely wear enough to allow the rotor to rub the stator.

(2) Grease replaces oil as a lubricant and is retained by felt seals. Motor remains clean.

(3) Grease is not fluid—does not vaporize.

(4) Grease lubrication required only from (1) to (4) times a year depending, on the severity of the service.

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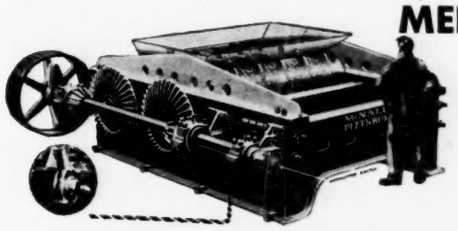
Send for Latest Bulletin!

WITH THIS BREAKER YOU CAN SUPPLY THE DEMAND FOR EGG OR MEDIUM LUMP



Patented Double Roll Breaker adjustable to produce any size between 6" and 18". Breaks without crushing.

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Scheduling of Mining Machinery Set Up; P-56 Revised to Conform to CMP

SCHEDULING of mining machinery and parts to channel them to the places where they are most urgently needed and a revision of P-56 to extend it to mines without serial numbers were among priorities and equipment developments in late February and March. The P-56 revision was designed to facilitate conformance to the Controlled Materials Plan, and provisions were made for expediting certain requests for priorities assistance in the Mining Equipment Division.

Order L-269 Governs

Scheduling was set up under Limitation Order L-269, issued March 11, and including the following provisions:

"(b) *Production and deliveries of mining equipment.* (1) On or before March 25, 1943, and on or before the 15th of each succeeding calendar month, each manufacturer shall file in triplicate on Form PD-815 a schedule of proposed production and deliveries and a report of the previous calendar month's shipments and orders.

"(2) On and after April 1, 1941, each manufacturer shall produce and deliver mining equipment only in accordance with the schedule filed pursuant to paragraph (b) (1) or as the same may be changed by the Director General for Operations.

"(3) With respect to mining equipment, the Director General for Operations may: (i) Direct the return or cancellation of any order on the books of a manufacturer; (ii) direct changes in the production or delivery schedule of a manufacturer; (iii) allocate orders placed with one manufacturer to another manufacturer, or; (iv) take such other action as he deems necessary with respect to the placing of orders for, or the production or delivery of, mining equipment.

"(c) *Repair parts.* The Director General for Operations may direct the quantity and type of repair parts to be produced or delivered by any manufacturer in any calendar month, and he may direct changes in any manufacturer's production or delivery schedule for mining equipment so as to provide for adequate production or delivery of repair parts.

"(d) *Substitution and Conservation of Critical Materials.* In the manufacture of any item of mining equipment or repair parts, no manufacturer shall use rubber, aluminum, copper, zinc or alloy steels, except in bearings, electrical conductors, or parts subject to high stress, shock, abrasion, wear or corrosion."

Scheduling of production and deliveries will be administered by the Mining Equipment Division on the basis of comparative urgency. In the case of coal mining, it is stated, scheduling "will be managed to channel repair parts, maintenance materials and machinery to the mines most urgently in need of it for the production of coal in critical areas. These areas will be determined on the basis of urgency or necessity by concurrence of the War Production Board and the Office of the Solid Fuels Coordinator."

The scheduling order relates only to the product groups coming under the jurisdiction of the Mining Equipment Division and repair parts therefor. Certain types of machinery and equipment are handled by the Construction or General Industrial Equipment divisions, but in the scheduling of these products the Mining Equipment Division is being consulted and its recommendations will largely control deliveries to mines. The equipment list appended to L-269 is as follows:

Coal-Cutting Machines
- Coal-cutting machines, all types
- Trucks for cutting machines, caterpillar and track-mounted

Drills
- Coal drills, electric
- Drilling machines, core drills

Mine Conveyors, Underground and Slope
- Conveyors, belt type
- Conveyors, chain-type
- Conveyors, elevating-type
- Conveyors, shaking-type
- Duckbill loading heads

Mine Haulage
- Mine locomotives (not exceeding 20 tons)
- Mine cars
- Mine-car couplers, automatic, cast-steel
- Shuttle cars, self-propelled trackless

Mine Hoists
- Hoists, portable mine, underground
- Hoists, stationary mine, shaft and slope

Mine Loaders
- Loaders, underground, mucking machines
- Loaders, underground, scraper and slusher
- Loading machines, mobile underground, other

Mining Equipment, Specialized
- Aerial tramways
- Coal-breaking equipment, cardox and airdox
- Dumpers, mine-car
- Mine doors, automatic
- Miners' lamps, wet-cell
- Charging racks for wet-cell lamps
- Rock-dust distributing machines
- Cages
- Skips

Crushing and Grinding Machinery, Stationary, Mine and Smelter Types
- Crushers, gyratory or cone, except those used as a part of a portable crushing plant
- Crushers, jaw, all sizes larger than 30x44 in. opening, except those smaller sizes of a type built exclusively for mining and smelting
- Crushers, vertical-pick coal
- Grinding mills, ball, rod, pebble, tube
- Pulverizers, ore

Ore Dressing and Coal Preparation Machinery
- Agitators (except concrete)
- Clarifiers and thickeners
- Classifiers, hydraulic
- Classifiers, mechanical, rake, spiral
- Classifiers, pneumatic
- Concentrating tables, gravity (wet, dry)
- Conditioners, pulp
- Density controllers
- Distributors, pulp
- Dryers, ore, coal, mineral
- Feeders, reagent (wet, dry)
- Filters, concentrate, gravity, pressure, vacuum
- Flotation machines, mechanical, pneumatic
- Heavy density separators (sink-float machines)
- Hydraulic separators
- Jigs, coal
- Jigs, ore
- Log washers
- Magnetic separators, ore and concentrate
- Mineral samplers, automatic, mechanical

Text of the major sections of the new P-56 order, omitting that part applying to certain foreign producers, is reproduced below:

"(c) *CMP Regulation No. 5 Not Applicable.* None of the provisions of CMP Regulation No. 5 shall apply to any producer, as defined herein, and no such producer shall obtain any material under said regulation.

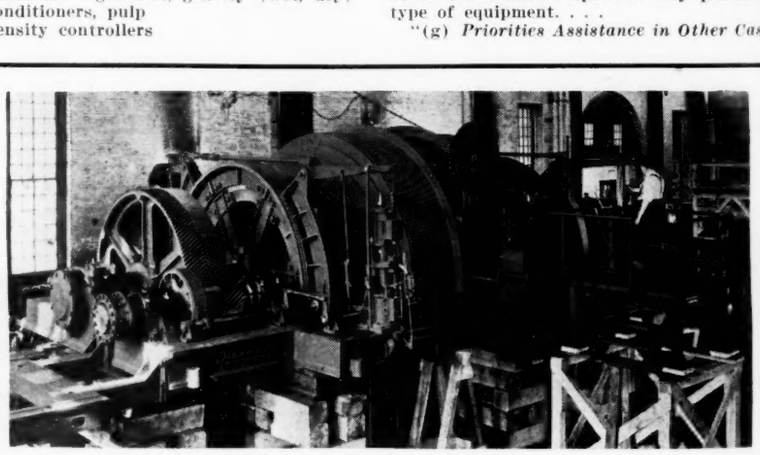
"(d) *Issuance of Serial Numbers.* Producers and districts may apply to the War Production Board for serial numbers. Such applications may be addressed to War Production Board, Washington, D. C., Reference: P56, or may (in the case of producers) be filed with the appropriate War Production Board Regional Office. Attention: Regional Technical Adviser, Mining Equipment Division, or with the appropriate State Coordinator of Mines. Serial numbers may be issued to producers and districts and may be denied or cancelled by the Director General for Operations in appropriate cases. In taking such action and in assigning priorities assistance, the Director General will consider the importance to national defense of the present and prospective output of materials to be produced, the consumption of critical material involved, the importance to national defense of competing demands for such material, and competing demands for manpower.

"(e) *Priorities Assistance for Producers With Serial Numbers.* Producers holding serial numbers may apply for priorities assistance as follows:

"(1) For maintenance, repair and operating supplies, by filing the appropriate form in the PD-400 series.

"(2) For mining machinery and other material and equipment, by submitting to the War Production Board a written application describing the machinery or equipment needed, the reasons why such machinery or equipment is essential for the proper operation of the producer's plant, and such other or further information as may from time to time be required, and shall also file such forms and supply such information as may be required by the provisions of any other order with respect to any particular type of equipment. . . .

"(g) *Priorities Assistance in Other Cases.*



New Coaldale Hoist

One of the largest hoists ever built for use in the anthracite coal fields has been delivered by the Vulcan Iron Works, Wilkes-Barre, Pa., to Coaldale colliery, Lehigh Coal & Navigation Co. Shown here set up in the shop prior to delivery, this 750-hp. unit is equipped with 9- to 15-ft. cylindro-conical drums.

Coal Men on the Job

"Mechanical foremen" is the local term applied to these mining supervisors in full-mechanical mine No. 207 of the Consolidation Coal Co., Jenkins, Ky. Left to right, standing: Roscoe Miller, Rex Lawson, John Arrington, L. B. McWilliams, Wade Collins, Haskell Davis, E. F. Colyer; seated, J. H. Blanton, R. S. Ellenberg, D. C. Smith (general mechanical foreman), Irvin Hall (assistant general mechanical foreman) and Wade Stapleton.

J. O. Watson 3d (left), assistant to division manager, and F. H. Price, chief clerk, Kentucky Division, Consolidation Coal Co., Jenkins, Ky.

W. S. Schubert, chief electrician of central shop, Consolidation Coal Co., Jenkins, Ky.

R. L. Blake (left), maintenance foreman of Mines 204, 206 and 207; A. A. Gilmore, maintenance superintendent, Kentucky Division; R. L. Kingsland, electrical and maintenance engineer, Consolidation Coal Co.

D. C. Duncan (left) foreman, central shop, and C. S. Dunlap, assistant foreman, Consolidation Coal Co., Jenkins.

W. E. Wright (left), tipple foreman, Mine No. 207, and J. H. Hunter, division coal inspector, Kentucky Division, Consolidation Coal Co., Jenkins.

B. H. Atkinson (left), assistant to division engineer, and R. J. Howard, division engineer, Kentucky Division, Consolidation Coal Co., Jenkins, Ky.

A. A. Gilmore (left), maintenance superintendent, Kentucky Division; R. L. Kingsland, electrical and maintenance engineer; J. D. Snyder, division superintendent, Kentucky Division, and J. W. Murry, construction engineer, Consolidation Coal Co.

B. V. Kegan (left), general mine foreman; R. L. Blake, maintenance foreman, and M. E. Printy, superintendent, Mine 207, Consolidation Coal Co., Jenkins, Ky.

HOW TO KEEP Bearings FROM GROWING OLD

A compact, portable washer—for ball or roller bearings up to 4" O.D.

Attachment furnished with washer for pressure air drying.

Heavy duty packer for ball or roller bearings up to 4" O.D. Quick, no waste, not "messy".

Keep 'em Young

—that's the answer. Remove and Inspect Regularly—give them good care and they will last indefinitely.

Here's a sensible, effective and economical method for keeping ball and roller bearings young . . . it's the Ahlberg 3-Step Method with Croft Equipment:

1. CLEAN—With the pressure solvent that flushes away every trace of dirt and old grease.

2. DRY—With air pressure—leaves a perfectly clean bearing, easy to inspect for wear.

3. REPACK—With a pressure grease packer which forces clean lubricant to every part and surface.

With new bearings hard or impossible to get, good maintenance is good patriotism. Your Ahlberg Jobber can supply this modern Croft Equipment that is saving time, labor and money for thousands of wide awake service shops. Don't fail to find out about this method of . . . .

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Many manufacturers you deal with regularly file their catalog data in COAL MINING CATALOGS to make your specifying, requisitioning, and buying *easier.*

If you haven't readily accessible the 1942 edition of this useful catalog, use the coupon on page 128.

A preference rating of A-2 is hereby assigned to deliveries of maintenance, repair, and operating supplies to all producers not holding serial numbers or otherwise specifically provided for in this order. Such producers may apply for priorities assistance for mining machinery or equipment, or for further priorities assistance for maintenance, repair, or operating supplies, by submitting to the War Production Board a written application containing the information described in paragraph (e) (2).

"(h) *Restrictions on Use of Priorities Assistance.* Notwithstanding the provisions of any other order or regulation of the War Production Board, no producer shall acquire any mining machinery or equipment, or maintenance, repair, or operating supplies through use of a preference rating or other form of priorities assistance assigned otherwise than pursuant to this order or an order in the P-19 series.

"(i) *Application and Extension of Priorities Assistance.* Preference ratings assigned and allotments of controlled materials made pursuant to this order shall be applied, extended or made in accordance with the terms of Priorities Regulation No. 3, CMP Regulation No. 1, or other relevant War Production Board regulation. A producer in making use of any such priorities assistance shall indorse on his contract or purchase order 'P-56, Serial number .....' inserting in the blank his serial number hereunder, if any. The use of such indorsement by a producer shall constitute a representation, subject to the criminal penalties for misrepresentation contained in Sec. 35A of the Criminal Code (18 U. S. C. 80), that the item ordered will be used for the purpose for which priorities assistance was granted to acquire it.

"(j) *Restrictions on Receipts and Inventory.* Notwithstanding the provisions of any other order or regulation of the War Production Board, including CMP Regulation No. 2, receipts and inventories of producers shall be subject to the following restrictions only: No producer shall receive any delivery of material which will increase his inventory to an amount greater than the minimum necessary to sustain his current level of operations, and the ratio of such inventory to current production shall in no event exceed the ratio of average inventory to average production for the years 1938, 1939, and 1940.

"(k) *Restrictions on Use and Resale of Material.* No person shall use any material obtained pursuant to this order for any purpose other than that for which priorities assistance was granted to acquire it; and no person shall resell any such material except:

"(1) To a producer holding a serial number hereunder, or

"(2) With the approval of the Mining Equipment Division, or

"(3) If he is located outside the United States and within a district, with the written approval of such district."

Under the new P-56 order, smaller mines without serial numbers will apply for materials and equipment needs directly to the Mining Equipment Division, which procedure does away with filing PD-1A forms, as well as with the alternate procedure of indorsing the now useless A-10 rating under P-100. For mines holding serial numbers, the present procedure will continue, using PD-400 for requirements for repair, maintenance and operating supplies. Beginning April 1, these forms authorize the indorsing of both a preference rating and an allotment number. New equipment, on the other hand, will be obtained through individual applications to the Mining Equipment Division, which issued a new outline of information for preference order for such new equipment or for emergency rating in case of a breakdown.

Beginning with the second quarter, a

preference rating with an allotment number takes precedence over the same rating without an allotment number. Controlled materials (steel, copper and aluminum) are not obtainable without an allotment number.

The new P-56 exempts mining operations from CMP Regulations 2 and 5 restricting inventories and maintenance, repair and operating supplies. Regulation No. 7 applies in that PD-400 forms must carry a certification as set forth in that regulation. Holders of project ratings under PD-200 forms, however, must file CMP forms Nos. 14 and 15. Any company having an approved project which has not been completed, on which deliveries of materials after April 1 will be required, should file these forms promptly with the Mining Equipment Division. Under CMP, holders of project ratings will continue to enjoy the ratings in effect, but will not receive allotment numbers automatically. On new projects which may be approved, arrangements will be made to assign allotment numbers concurrently with the authorization of the preference ratings.

Allotment Number Provided

The new PD-400 forms provide for both a preference rating AA-1 and an allotment number for the purchase of a specified allotment of controlled materials, under a weight quota, and also for the purchase of fabricated repair parts and operating supplies under dollar-value quotas, stated A. S. Knoizen, director, Mining Equipment Division, in an explanatory letter March 18.

Purchase orders must bear the indorsement required by CMP Regulation 7, together with the assigned rating, the allotment number and the P-56 serial number. Further, to secure acceptance of orders for controlled materials, it is necessary to place after the allotment number a figure indicating the month in which delivery is required. For this purpose, April, 1943, has been assigned "16," with "17" for May, "18" for June, etc. Acceptance by the supplier makes him responsible for delivery within the month indicated. If the supplier cannot make delivery in the month specified, he must not accept the order. "If difficulties arise as a result of refusals to accept orders for this reason, the Mining Equipment Division will give all the assistance possible in suggesting other suppliers who may be in a position to accept such orders.

"In addition to the allotment of controlled material for purchase and delivery in the second quarter, orders may be placed for delivery of controlled materials in the third quarter up to 80 percent of the amount of the second-quarter controlled-material allotment, and also for delivery in the fourth quarter of 1943 and the first quarter of 1944 up to 60 and 40 percent respectively of the same allotment." Deliveries for advance quarters are to be indicated by the proper figures after the allotment number.

"For all other material requiring a rating under the PD-400 quotas, the allotment number merely adds to the value of the preference rating, except for

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The staggering quotas for 1943 demand continuous peak production from every *single* piece of your machinery and equipment. Sizing and grading may be of relatively small importance but you can't allow it to be the one *weak link* in your production plans.

Right now, while you still have the opportunity to own one, check on the advantages of Plat-O Vibrating Screens . . . a screen designed and built by men who have made a *specialized* study of screening problems . . . on the job and in the laboratory.

- √ Powerful positive high speed.
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Look For It First In Coal Mining Catalogs

131 prominent manufacturers have placed their recent catalog data in COAL MINING CATALOGS to speed your requisitioning and purchasing.

To see how this complete, convenient buying reference saves you time, turn to page 128 of this issue.

Jeffrey entry gathering conveyor driven through a DE LAVAL Worm Gear
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FOR HEAVY DUTY DRIVES specify DE LAVAL WORM GEARS

The high efficiency and reliability of De Laval worm gears is especially valuable in continuous, 24-hour service. The efficiency approaches 97 per cent at some ratios and increases, rather than recedes, with use. Power is transmitted without vibration, chatter or shock. The only maintenance required is occasional inspection of the oil level in the casing.

The driven shaft can be extended to either right or left, or both, or either up or down, or both.

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BUILDERS—PROVIDENCE

'A' products bought directly from a manufacturer of 'A' products. . . . The acceptance of an order for other than controlled materials does not obligate the manufacturer to meet any delivery date specified in the allotment number."

For materials other than controlled, the provisions for placing advance orders are the same. "To provide for the transition from the previous delivery-basis quota to this order-placing quota, we are following the current PRP ruling that orders placed in the first quarter but not delivered until April 1 may be received up to April 21 and still deducted from the first-quarter quota. All orders placed after April 1 and all deliveries received after April 21 must be deducted from the second-quarter quota. Your allotment number and preference rating may be assigned by letter to outstanding orders which will be delivered after April 21." If quotas are not adequate, application should be made at once to the Mining Equipment Division, as no indorsements may be made beyond quota limits without specific authorization in advance.

"Your dollar-value quotas and ratings provided by them must not be used for maintenance, repair and operating supply items that do not require the application of a rating. . . . Lumber is to be obtained under the provisions of Order M-208, as amended, under which an AA-3 rating is authorized. If ratings higher than AA-3 are necessary to obtain delivery, an AA-1 rating under the dollar-value quota for operating supplies may be used and cost deducted from that quota."

Other equipment and materials developments included assumption by WPB of absolute control over scheduling of the production of "critical common components" (March *Coal Age*, p. 116) under General Scheduling Order M-293, issued Feb. 26. The new order sets up three critical lists, the first—and least critical—including valves, motors, welding rod, ball and roller bearings, etc., and the third—and most critical—including machine tools. A few days earlier, oxy-acetylene apparatus was placed under General Conservation Order L-268, providing, among other things, that after March 6 no manufacturer or dealer can accept an order unless with an AA-5 or higher rating and forbidding delivery, except on the same ratings, after April 25. Repair parts for apparatus then in the hands of the user, however, were exempted.

In applying for quotas, operators with items in their inventories not usable in the immediately following quarter were cautioned to explain the facts fully in making such applications. Use of bessemer plates instead of open-hearth types wherever possible was suggested on the ground that bessemer types up to ½ in. in thickness are much more readily available.

In operating under Limitation Orders, it was suggested in March that requests for requirements for materials which would have to be handled by other WPB divisions be cleared through the Mining Equipment Division, which would expedite their handling. James E. Organ was added to the mining-machinery section of the division to serve as an expediter in handling certain major problems.

To Build Cable Stocks

The Mining Equipment and Copper division announced a plan to build up reasonable stocks of copper wire and cable at Phoenix, San Francisco, Seattle, Butte, Denver, St. Louis, Chicago, Terre Haute, Harlan, Ky., Knoxville, Birmingham, Charleston, W. Va., Bluefield, W. Va., Wheeling, Pittsburgh, Johnstown, Scranton and Pottsville, Pa. The plan is to maintain sufficient quantities of both bare wire and insulated cable to insure prompt delivery to mines where actual need is shown, such delivery to be governed from the standpoint of quantity by the copper warehousing regulations.

Order L-53-B, effective March 20, has been issued by WPB, in effect allocating 20 percent of repair parts for tracklaying tractors to "essential civilian operations," which step is expected to ease the problems of mines using this equipment. Core or churn-drilling contractors receiving supplies and materials through the Mining Equipment Division now are authorized to operate on any mining property holding a serial number without, as formerly, securing permission. Miners without No. 17 stamps, it was announced, would be able to apply to ration boards for special certificates for purchasing safety shoes, and thus would not have to use the stamps of other members of the family.

Food for miners was the subject of considerable discussion and analysis in

March, and as a result it seemed likely that special provisions would be made for extra rations for employees in heavy industries, including mining.

•

Technical Books Sought For Men in Army

The 1943 Victory Book Campaign, sponsored by the American Library Association, American Red Cross and United Service Organizations, is collecting books for men in the fighting forces. On the lighter side, the men have indicated preferences for current best sellers in the fiction and non-fiction fields; adventure, detective, mystery, sea, and western yarns; and humor in fiction and cartoon form.

But these men also have a serious side. Thousands of them interrupted college courses and established professional careers to enter the armed forces. These are anxious to keep abreast of technical developments in the fields in which they have specialized. That is why the campaign is asking for technical books published since 1935, in the following fields: architecture, aeronautics, chemistry, drawing, machine design, mathematics, meteorology, navigation, photography, physics, radio, shop mechanics, civil and mechanical engineering.

Public libraries all over the country are the official collection and sorting centers for the 1943 Victory Book Campaign.

•

Lignite Processing Plant On Way in Ontario

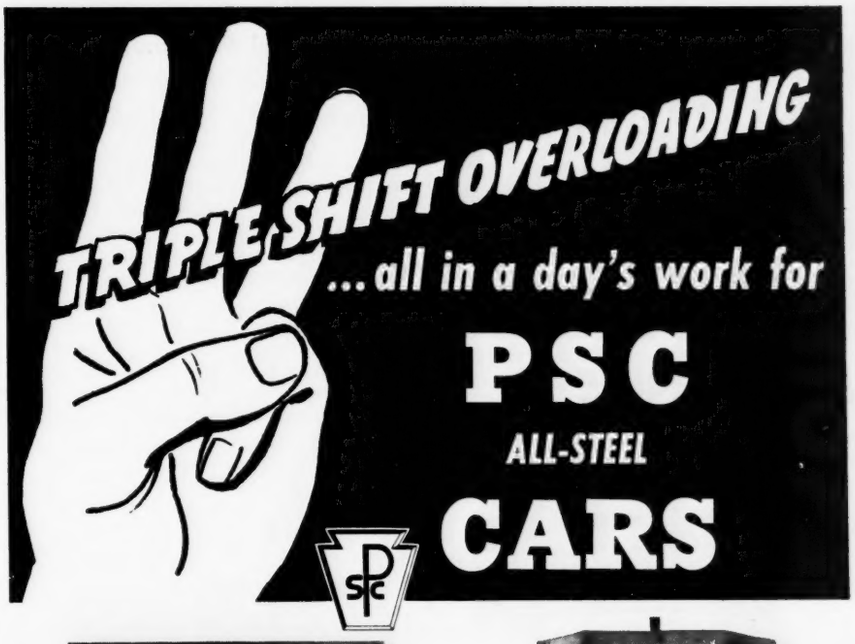
A processing plant to treat lignite will be in operation in northern Ontario by next September as part of the provincial government's program for development of the Onakawana lignite field, according to W. G. Nixon (Lib., Temiskaming). Revealing to the Legislature the results of several tests, Mr. Nixon said that lignite dried under 200 lb. pressure had worked when used in locomotive engines and in furnaces and stoves in private houses. Some of the tests with lignite mixed with coal proved satisfactory. The new plant is to use 400 lb. pressure, Mr. Nixon told the House. Laboratory tests indicated the advisability of steam-drying at that pressure rather than the lower figure.

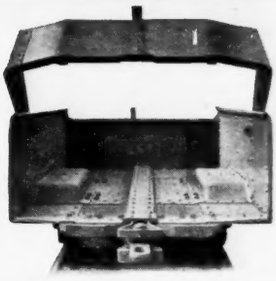
Despite difficulties in obtaining needed equipment from the United States, Mr. Nixon said that steady progress has been made. A plant with boiler has been located at Peterborough. Gasification of the lignite, it was said, might offer a field for further study. Coal consumption in the territory served by the Temiskaming & Northern Ontario R.R. totals about 300,000 tons annually, servicing of one-third of which would provide a large-scale commercial development.

•

Butte Valley Mine Reopened

Butte Valley mine of the Butte Valley Coal Co., Butte, Colo., closed since an explosion on Nov. 23 last, was reopened on Feb. 26 preparatory to resuming production as soon as a final inspection was made. The blast of last November took the lives of three men.





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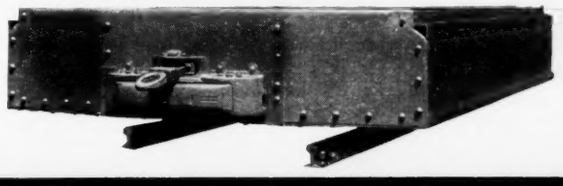

Let our engineers recommend the PSC Cars best suited to your requirements. Bulletin 66 is yours on request.

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Still other readers can provide the solution of your problem if they know what it is! Tell them! Here!

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FOR *Absolute Uniformity* OF SCREENING *and* STOKER SIZES

MECHANIZE YOUR SAMPLING

Automatic Geary-Jennings Samplers permit you to control your preparation sizes with minimum manpower. These machines take accurate samples regularly, eliminate guesswork, need no attendance, assure your customers uniform blends, protect you against costly waste losses.

Use the coupon for detailed information.

Advantages

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Gentlemen: Tell us how your Geary-Jennings Automatic Samplers could be applied to our plant conditions. We are interested in sampling .... our refuse; .... our coal in following sizes ..... at intervals of .... minutes. It would be most convenient to locate your equipment (please check) at .... end of chute, ... chain type conveyor, ... apron conveyor, ... belt type conveyor, or ..... state width conveyor or chute.

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1942 Book of Standards Issued by A.S.T.M.

American Society for Testing Materials' Book of Standards for 1942 has been issued. In three parts, it contains in their latest approved form all of the society's widely used specifications and tests for materials, definitions and recommended practices. It has 1,090 specifications and standard methods covering more than 4,900 pages.

Continuing the policy first used with the 1939 book, the latest edition gives all specifications, whether formal standards or tentative. The divisions are:

Part I, Metals—Ferrous and non-ferrous metals (all A and B and some E serial designations) except methods of chemical analysis. General testing methods (E serial designations).

Part II, Non-Metallic Materials, Constructional—Cementitious materials, concrete and aggregates, masonry building units, ceramics, pipe and tile, thermal insulating materials (all C serial designations). Timber and timber preservatives, paints, varnishes and lacquers, road materials, waterproofing and roofing materials, soils (certain D serial designations). General testing methods, thermometers (E serial designations).

Part III, Non-Metallic Materials, General—Fuels, petroleum products, electrical insulating materials, rubber, textiles, soaps and detergents, paper, plastics, water (remainder of D serial designations). General testing methods, thermometers (E serial designations).

To keep the books up to date in 1943 and 1944, a supplement will be issued to each part in each of these years. As a service with the 1942 Book of Standards there is a complete 200-page index to standards, which is furnished without additional charge and a copy accompanies the purchase of each part or complete set.

The cost of each part is $9; the charge for supplements is $3 for each part, each year; for half leather binding add $1 extra for each part and each supplement part.

•

New Preparation Facilities

Antioch Power Co., Lincoln, Ind.—Contract closed with Deister Machine Co., Inc., for two Deister Plat-O washing tables to prepare fuel for power plant; capacity, 30 tons per hour.

Central Construction & Supply Co., Harrisburg, Pa.—Contract closed with Deister Concentrator Co. for eight SuperDuty Diagonal-Deck washing tables to clean barley size river coal.

Huntsville-Sinclair Coal Co., Huntsville, Mo.—Contract closed with McNally-Pittsburg Mfg. Corp. for additions to tipple and cleaning plant to permit crushing all mine-run to 6-in. and by addition of one McNally-Norton automatic washer increase washed-coal tonnage 250 tons per hour; to be completed about Oct. 1.

Winton Coal Co., Tamaqua, Pa.—Contract closed with Deister Concentrator Co. for one SuperDuty Diagonal-Deck No. 7 washing table to treat No. 4 buckwheat.

BEHIND THE GUN

. . . and behind the machine, men have learned to depend on Coffing Hoisting Equipment. Rugged — dependable and economical. All Coffing ratchet lever hoists are tested up to 100% over rated capacity. Illustrated is model ATG "Safety Pull" ratchet lever hoist. Write today for Catalog GG 6.

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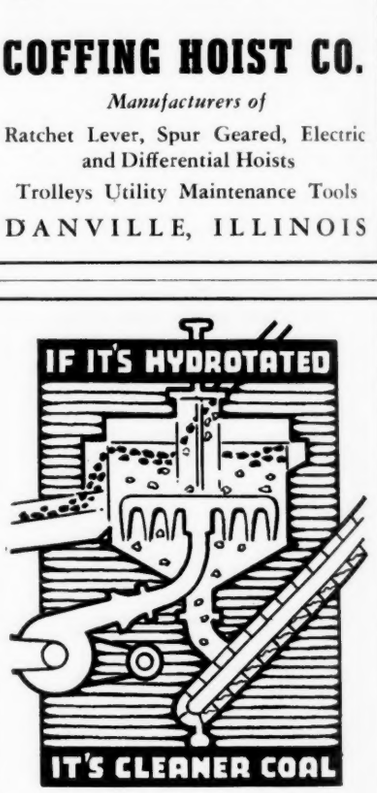

WILMOT "Hydrotator" Coal Cleaning Units are geared for the increased war production of anthracite. Automatic operation assures uniform high quality under emergency conditions.

WILMOT ENGINEERING CO.
HAZLETON, PA.

WILMOT
A GREAT NAME IN THE COAL INDUSTRY
HYDROTATOR
COAL *Preparation* UNITS

Flushing Program Proposed To Halt Anthracite Caves

A flushing program under the direction of an Anthracite Subsidence Commission to be financed by a $50,000 State appropriation and a tax of 2¢ a ton on hard coal is proposed by a legislative investigating committee as a solution for eastern Pennsylvania's mine cave-in problems. Declaring that "flushing is the only practical approach" to the problem, the commission on March 16 suggested to the General Assembly at Harrisburg, after a two-year study, the creation of a three-member subsidence agency in the State Department of Mines.

Only five days previous, residents of Pittston were rocked in their beds at 11 p.m. when a surface settling cracked foundations of houses, shook plaster from bedroom walls and otherwise damaged a number of homes in a residential area over No. 9 colliery of the No. 9 Coal Co.

The joint Senate-House group, headed by Senator George B. Stevenson (R., Clinton), proposed that members of the permanent subsidence commission be required to have at least 15 years' mining experience and be empowered to:

"Make or have made a complete survey and estimate of the voids under built-up areas; to set forth a complete long-range flushing program, initiate actual flushing operations and to arrange flushing programs with the State and Federal governments under their respective post-war planning."

The agency also would make a survey "as a basis for subsidence insurance purchasable by property owners" to provide financial protection against damage by cave-ins.

The 1945 Legislature would pass on recommendations of the flushing and insurance programs.

Bills to carry out the recommendations of the commission are being drafted for presentation to the General Assembly.

•

Kansas Coal Produces Coke For Water Gas

In its program of promoting efficient utilization of coal for the war, the U. S. Bureau of Mines has completed a study revealing that a high-sulphur high-volatile coal from Kansas can be used to produce coke for making water gas (illuminating gas), according to Dr. R. R. Sayers, Director of the Bureau.

Prior to the Bureau's study many believed that the coal from the Bevier bed of Crawford County, Kansas, could not be used in the slot-type coke ovens without damaging equipment. However, tests were conducted successfully in both the slot-type (Koppers) and the flat-type (Curran-Knowles) ovens, Dr. Sayers said in referring to the Bureau's report.

Coke produced in the Curran-Knowles ovens was utilized in producing water gas, but tests showed that it is not advisable to feed the coke on water-gas generators using mechanical grates because of the low softening temperature of the coke ash and the readiness with which it liquefies.

Although the water gas produced by the coke contained high percentages of hydrogen sulphide and organic sulphur, Bureau chemists said these undesirable materials can be removed.

Copies of the report may be obtained by writing the Bureau of Mines, Department of the Interior, Washington, D. C., for Report of Investigations 3671, "Carbonization of Bevier Bed Coal From Kansas and Production of Blue Water Gas From the Resulting Coke," by W. W. Odell.

•

Bituminous Promotional Group To Renew Its Program

Following extended discussion at the meeting of the board of directors of the National Coal Association March 5 at Cleveland, Ohio, considerable progress was made in March toward reinstating the promotional and advertising program of the bituminous coal-mining industry. As a result of decision that now is the time to reembark on its public-relations program, a meeting of the board of directors of Bituminous Coals, Inc., who also are members of the N.C.A. executive board, was scheduled for March 13 at New York.

Definite decision to reinstate its program, suspended some two years ago, was reported as the outcome of the New York meeting, with the thought that it also would serve as a potent tool in building appreciation of their responsibility and reducing absenteeism among the men at the mines. Officers were chosen for Bituminous Coals, Inc., as follows: president, C. C. Dickinson, also president, N.C.A.; vice presidents, J. P. Williams Jr., president, Koppers Co., and Grant Stauffer, president, Sinclair Coal Co.; treasurer, R. L. Ireland Jr., president, Hanna Coal Co.; secretary, John D. Battle, executive secretary, N.C.A.

Committees to work out the details of the plan were to be named by Mr. Dickinson, it was announced, and preparations were undertaken to acquaint the coal industry with the plan and what it is hoped to accomplish.

•

Coal-Mine Accident Fatality Rate Still on Downgrade

Accidents at coal mines of the United States caused the deaths of 96 bituminous and 8 anthracite miners in January last, according to reports furnished the U. S. Bureau of Mines by State inspectors.

With production of 47,029,000 net tons, the accident death rate among bituminous miners was 2.04 per million tons, compared with 2.72 in January, 1942.

The anthracite fatality rate from accidents in January last was 1.85, based on an output of 4,314,000 net tons, against 3.31 in the first month of the preceding year.

For the two industries combined, the accident fatality rate in January last was 2.03, compared with 2.45 in the corresponding month of the preceding year.

Fatalities during January last, by causes and States, as well as comparable rates for the first month of 1942 and 1943, were:

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

January, 1942 and 1943

	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
Underground	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943
Falls of roof and coal	58	151	1.186	1.084	11	1	2.427	0.232	69	52	1.292	1.013
Haulage	22	12	.450	.255	1	3	.221	.695	23	15	.430	.292
Gas and dust explosions:												
Local	....	3	....	.064	...	...	....	....	....	3	....	.058
Major	34	....	.696	....	...	...	....	....	34	....	.636	....
Explosives	1	1	.020	.021	...	1	....	.232	1	2	.019	.039
Electricity	3	2	.061	.043	2	...	.441	....	5	2	.094	.039
Machinery	2	2	.041	.043	...	...	....	....	2	2	.037	.039
Shaft	2	1	.041	.021	...	...	....	....	2	1	.037	.019
Miscellaneous	1	13	.020	.276	...	1	....	.232	1	14	.019	.273
Stripping or open-cut	2	4	.041	.085	...	...	....	....	2	4	.037	.078
Surface	7	7	.143	.149	1	...	.221	.463	8	9	.150	.176
Total	132	96	2.699	2.041	15	8	3.310	1.854	147	104	2.751	2.026

*All figures subject to revision.

UNITED STATES COAL-MINE FATALITIES IN JANUARY, 1943, BY CAUSES AND STATES

	Underground												
State	Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Mine Fires	Other Causes	Total Underground	Shaft	Open-Cut	Surface	Grand Total
Alabama	1	..	1	..	..	1	..	..	..	3	..	..	1	4
Colorado	..	2	1	..	..	..	..	..	..	3	..	..	..	3
Illinois	5	..	2	..	..	..	1	..	..	8	..	..	1	9
Indiana	2	..	..	..	..	..	..	..	..	2	..	..	..	2
Iowa	1	..	..	..	..	..	..	..	..	1	..	..	..	1
Kansas	..	..	..	..	1	..	..	..	..	1	..	2	..	3
Kentucky	7	..	1	..	..	1	..	..	..	9	..	..	..	9
New Mexico	1	..	..	..	..	..	..	..	..	1	..	..	..	1
Ohio	1	..	1	3	..	..	..	..	..	5	..	..	2	7
Oklahoma	1	..	..	..	..	..	..	..	..	1	..	..	..	1
Penna. (bit.)	15	..	2	..	..	..	..	..	..	17	..	2	..	19
Utah	2	..	..	..	..	..	..	..	..	2	..	..	..	2
Virginia	4	..	..	..	..	..	..	..	..	4	..	..	..	4
West Virginia	8	1	4	..	..	..	1	13	..	27	1	..	3	31
Total bituminous	48	3	12	3	1	2	2	13	..	84	1	4	7	96
Penna. (anth.)	1	..	3	..	1	..	..	..	1	6	..	..	2	8
Grand total	49	3	15	3	2	2	2	13	1	90	1	4	9	104

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Appropriations Sought For Study of New Coal Uses

Funds for study of new uses for coal are being sought by lawmakers in Illinois and Pennsylvania. Representative Calvin Johnson (R., Ill.) stated on Feb. 23 that at his request the Illinois State Geological Survey is drafting legislation embodying his proposal of a nation-wide system of laboratories to seek new uses at an outlay of about $2,000,000, which he said would develop the full potential of vast natural deposits. He advocated that the Federal Government allocate funds to the individual States and that each State decide in which direction its scientists would proceed.

The Pennsylvania Legislature was asked on Feb. 24 to appropriate $100,000 to carry on the anthracite and bituminous coal research program at Pennsylvania State College started in 1939. In the first year the Legislature provided $35,000, which was matched by the coal industry, to carry on a study of new uses for both hard and soft coal. Two years later the lawmakers appropriated $60,000 for continuation of the work, the industry adding $30,000.

In a report on the study presented to the Legislature, Senators A. H. Letzler (R., Clearfield) and G. Harold Watkins (R., Schuylkill) declared "Emphasis is now being placed on problems that have a direct bearing on the war effort and the nation's fuel problems." The report said: "Research not only aids the nation in its war effort but is a form of insurance to protect these industries [hard and soft coal] and the citizenry of the Commonwealth in the aftermath of the war."

•

Big Sandy-Elkhorn Institute Bestows Safety Awards

Awards for safety were bestowed at the annual meeting of the Big Sandy-Elkhorn Coal Mining Institute, held Feb. 28 at Pikeville, Ky. For the best accident record among Class A mines (producing more than 200,000 tons per year) the award went to the High Hat Elkhorn Mining Co., Fed, Ky. For Class B mines (producing less than 200,000 tons annually) the honors went to No. 4 mine of the Elk Horn Coal Corp., Inc., Cromona, Ky. Ten foremen were given lapel buttons signifying men working under them had suffered no accidents during the periods stated: three-year gold buttons—Morgan Johnson and John M. Gunning; two-year silver buttons—Jasper Taylor and John Basham; one-year bronze buttons—Paul Campbell, Chester Cureton, Buck Music, A. J. Allen and Roy Hill.

To enable all mine officials to attend monthly meetings of the institute despite the six-day work week and multiple day shifts, the meeting day was changed from Friday night to the last Sunday afternoon of the month. A buffet luncheon and entertainment featured the first Sunday meeting. These officers were elected: president, M. K. Reed, Drift, Ky., vice J. T. Parker; first vice president, J. E. Green; second vice president, Herbert Wheeler; third vice president, V. D. Picklesimer;

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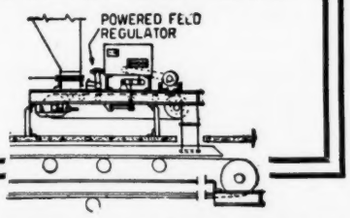

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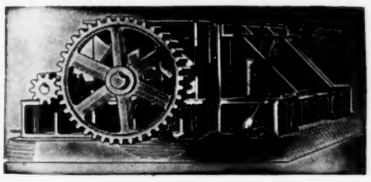

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•

Monongahela Valley Group Moves to New York

Offices of the Coal Bureau of the Upper Monongahela Valley Association were moved on March 15 from Fairmont, W. Va., to New York City at 122 East 42d St. According to Julian E. Tobey, managing director, because the bureau is now concentrating largely on war and post-war activities and its program has to do with markets, consulting engineers and equipment manufacturers principally located in the East, the move was authorized by the management committee, composed of the following: Frank R. Amos, Christopher Coal Co.; Daniel T. Buckley, Koppers Coal Division, Eastern Gas & Fuel Associates; E. C. Payne, Consolidation Coal Co.; Joseph Pursglove Jr., Pursglove Coal Mining Co.; and A. C. Spurr (chairman), Monongahela West Penn Public Service Co. Members of the bureau represent more than 80 percent of the output from the Fairmont-Pittsburgh Coal seam.

•

Explosion in Montana Mine Takes 74 Miners' Lives

An explosion in the morning of Feb. 27 trapped 72 miners in Seam 3 of the Smith mine of the Montana Coal & Iron Co., Washoe, Mont. Five men working in Seam 2 in another part of the mine were brought out of the mine soon after the blast, but two of them were dead. The last of the bodies of the other 72 were recovered on March 8. The trapped men were about 800 ft. below the surface and nearly 1¼ miles from the slope-mine entrance. The disaster occurred soon after the day shift started work, at 10:30 a.m.

•

To Reopen Big Mountain Mine

Big Mountain anthracite colliery, near Shamokin, Pa., operated several years ago by the Philadelphia & Reading Coal & Iron Co., is to be reopened soon by the Twin Valley Coal Co., according to Edward A. Thomas, general manager of the latter company, which has leased the property from the P. & R. Between 450 and 600 men are to be employed. Dewatering of the mine was expected to be completed early in April. A new electric hoist contracted for by the lessee is to have a capacity of more than 6,000 tons of coal in a seven-hour work day, said Mr. Thomas.

Officers of the Twin Valley company include: president, James F. Kelley, deputy treasurer of Coal Township; and secretary-treasurer, Angelo Christiana, a Shamokin stripping contractor. Mr. Thomas formerly was general manager of the Girard Mammoth Coal Co.

Moved!

To better concentrate its services and facilities on postwar activities which will be based upon a long-range program having to do with markets and cooperation with consulting engineers and equipment manufacturers located largely in the east, offices of the Coal Bureau of the Upper Monongahela Valley Association have been established in New York City, moving March 15 from Fairmont, West Virginia. Office of the Association will still be maintained in Fairmont.

Julian E. Tobey, managing director, is in charge of the New York office located in the Chanin Building at 122 East 42nd street. Since last April, when the bureau was established in Fairmont, a comprehensive program has been carried forward to develop wider acceptance for Fairmont-Pittsburgh seam coal. Coal Bureau members produce more than 80 per cent of the coal mined from this seam in the Fairmont field.

Operating Economies

With the bureau well organized to perform the services it offers consumers of bituminous coal, it is believed the next step is to bring to the attention of industrial coal users the economies of the Fairmont-Pittsburgh seam product and then work closely with these users toward the goal of proper utilization through research and equipment improvements.

Major emphasis of the bureau will be placed upon the study of post-war markets and the important part coal costs will play in the industrial picture of tomorrow.

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FAIRMONT REGION
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An Invitation

Bituminous coal, so vital to the war effort now, will be even more important in establishing and maintaining a period of prosperous peace. The Coal Bureau welcomes consultation about any problems within its field of operations.

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Completing the Record

Through inadvertence, Table I, prepared by Sylvain J. Pirson, Pennsylvania State College, showing the decrease in net new reserves of oil discovered since 1938, even though the total number of exploratory wells has increased each year since 1939, was omitted from Arno C. Fieldner's article on the "Outlook for Coal in Supplying Liquid Fuels and Coke," in the February, 1943, issue of *Coal Age*, p. 109. The table is at left.

TABLE I.—SUMMARY OF RECENT WELL DRILLING AND DISCOVERIES

	Total Wells Drilled	Total Exploratory Wells Drilled	Total Successful Exploratory Wells	Number of New Oil Fields Discovered	Net New Reserves Discovered (Millions of Barrels)	Production of Crude (Millions of Barrels)	Gross Discoveries of Crude Oil (Millions of Barrels)
1934.....	20,793	.....	.....	86	1,668	908	2,576
1935.....	24,273	.....	.....	104	1,901	966	2,867
1936.....	28,546	.....	.....	104	1,757	1,099	2,856
1937.....	33,945	2,224	222	148	1,898	1,279	3,177
1938.....	28,060	2,638	294	166	1,816	1,214	3,030
1939.....	27,658	2,589	224	170	766	1,264	2,030
1940.....	30,656	3,038	302	217	674	1,353	2,027
1941.....	32,265	3,113	486	340	400	1,403	1,803

Source: "The Oil Weekly Yearbook," Jan. 26, 1942; also, March 2, 1942; published in *Mineral Industries*, Pennsylvania State College, November, 1942.

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Coking and Physico-Chemical Properties of Coal Treated

Stated to mark the first major contribution to the literature of coal by a physical chemist deeply versed in the fundamentals of his subject, "Coke-Formation Process and Physico-Chemical Properties of Coals," by W. Swietoslawski, professor of physical chemistry at the Institute of Technology of Warsaw, Poland, was published March 1 by the Polish Institute of Arts and Sciences in America, New York City; price, $3.50.

Comprising fifteen chapters covering 145 pp., the subjects treated include: coals as inhomogeneous systems; adsorption and sorption phenomena in coals; development of the surface by activation processes; ignition temperature of solid fuels; plasticity of bituminous coals; plasticity phenomena and binding capacity of coals; aggultination capacity of coals; swelling phenomena in coking coals; binary mixture method; permeability of the plastic zone; heat of carbonization of coals; total amount of gases and vapors developed during carbonization; physico-chemical analyses of the coke-formation process; coke formation process in mixtures of non-coking coals and pitch; optimal conditions for the coke-formation process.

Eureka No. 2 Leased

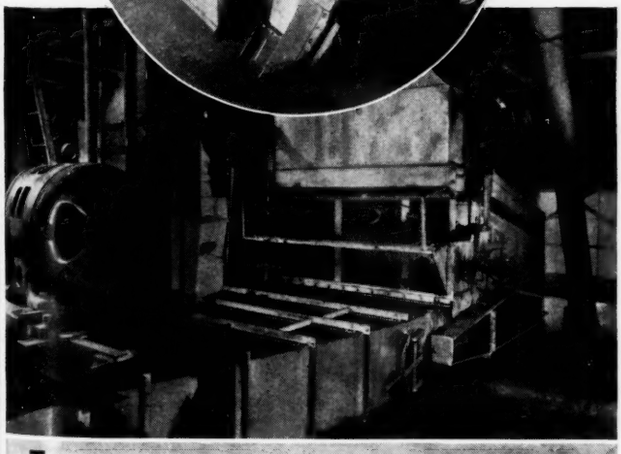
Eureka No. 2 mine of the Forsyth Carterville Coal Co., Tilden, Ill., which has been inactive for five years, has been leased to the Randolph Coal Corp., a new organization headed by C. V. Beck. The lessee is preparing to reopen and operate the property.

Open Brookside-Pratt Washery

A new washery has been placed in operation by the Brookside-Pratt Mining Co., at its Blossburg "E" mine, Blossburg, Ala. The structure, which replaces one destroyed by fire, had been in course of construction for several months. During the delay, caused by inability to obtain delivery of material and equipment, the company had been producing a large tonnage of mine-run, which it will now be possible to prepare for special market needs.

Buys Eastern Kentucky Tract

Purchase of 25,000 acres of coal lands in Perry County, Kentucky, adjacent to the Letcher County line, has been completed by the Kentucky River Coal Corp., it was announced on March 11 by G. T. Howard, president. The property lies along and adjacent to the Louisville & Nashville Ry.'s Eastern Kentucky branch and extends to the headwaters of both Big and Little Leatherwood creeks. The tract contains at least three workable seams of coal.



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Wayland Mine of The Elkhorn Coal Corporation is a good example. Roberts and Schaefer studied the coal and the existing plant; recommended and installed a pneumatic cleaning plant to supplement existing equipment. The results have confirmed the anticipated values.

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Take this sensible first step on the profitable road to modern coal preparation: put your problem before this seasoned, thoroughly practical group of specialists.

THIS MINE was originally equipped with screening equipment for hand-picking only. When need arose for mechanical cleaning equipment, a jig was installed for washing the 5" x ¼" size. When still further preparation was necessary, Roberts and Schaefer was called in—and installed a pneumatic cleaning plant for preparing 100 tons per hour of ¼"x0 coal delivered from the screens in the original plant. The pneumatic cleaning plant is unique in its use of Raymond mechanical air separator to remove 48 mesh x 0 dust, which is sufficiently high in ash to be rejected. The ¼ x 48 mesh delivered from the mechanical air separator is cleaned on two 6' Stump Air-Flow boxes equipped with multiple refuse draws, and arranged for recirculation of middlings from which the minus 14 mesh coal has been screened and rejected. The cleaned coal is delivered to secondary vibrating screens for further sizing, and rejection of high ash fines before reassembling with other washed sizes.

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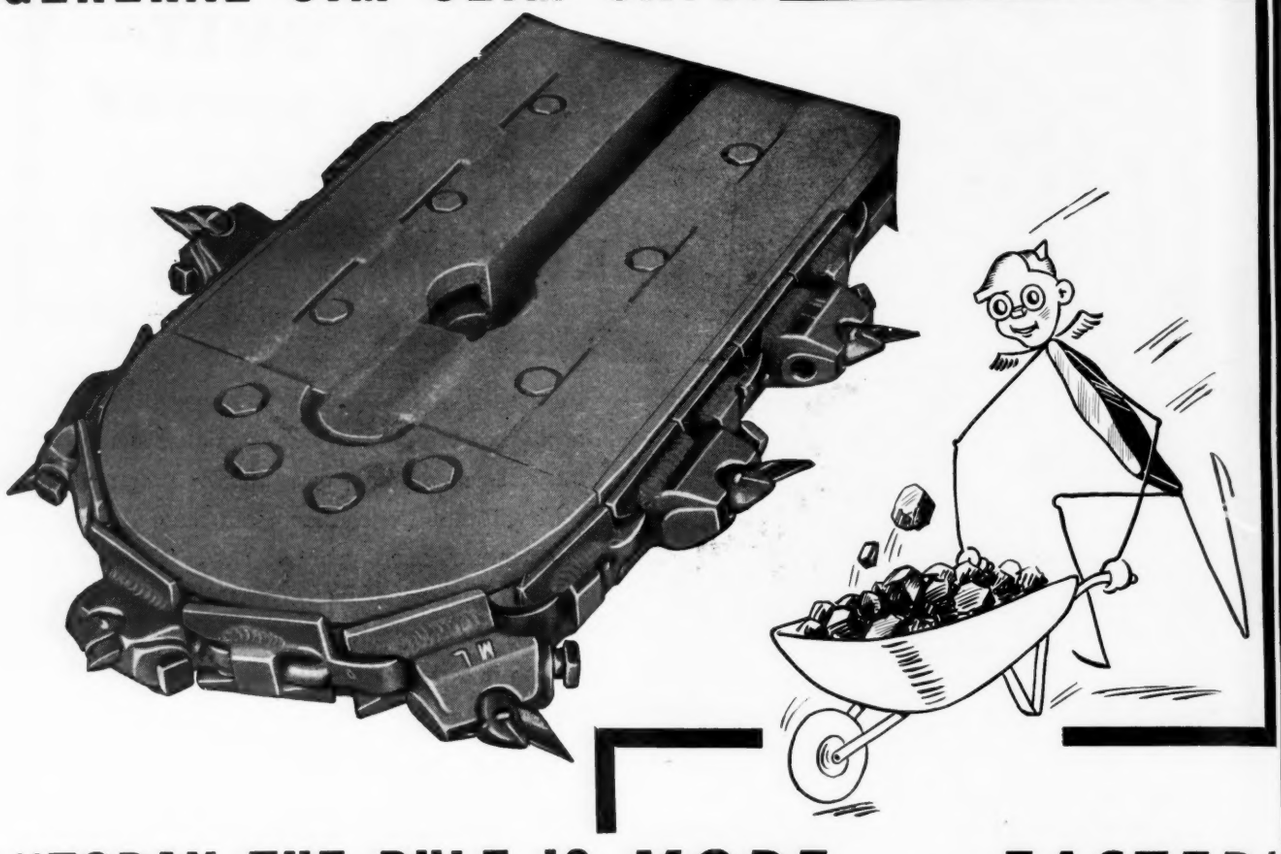

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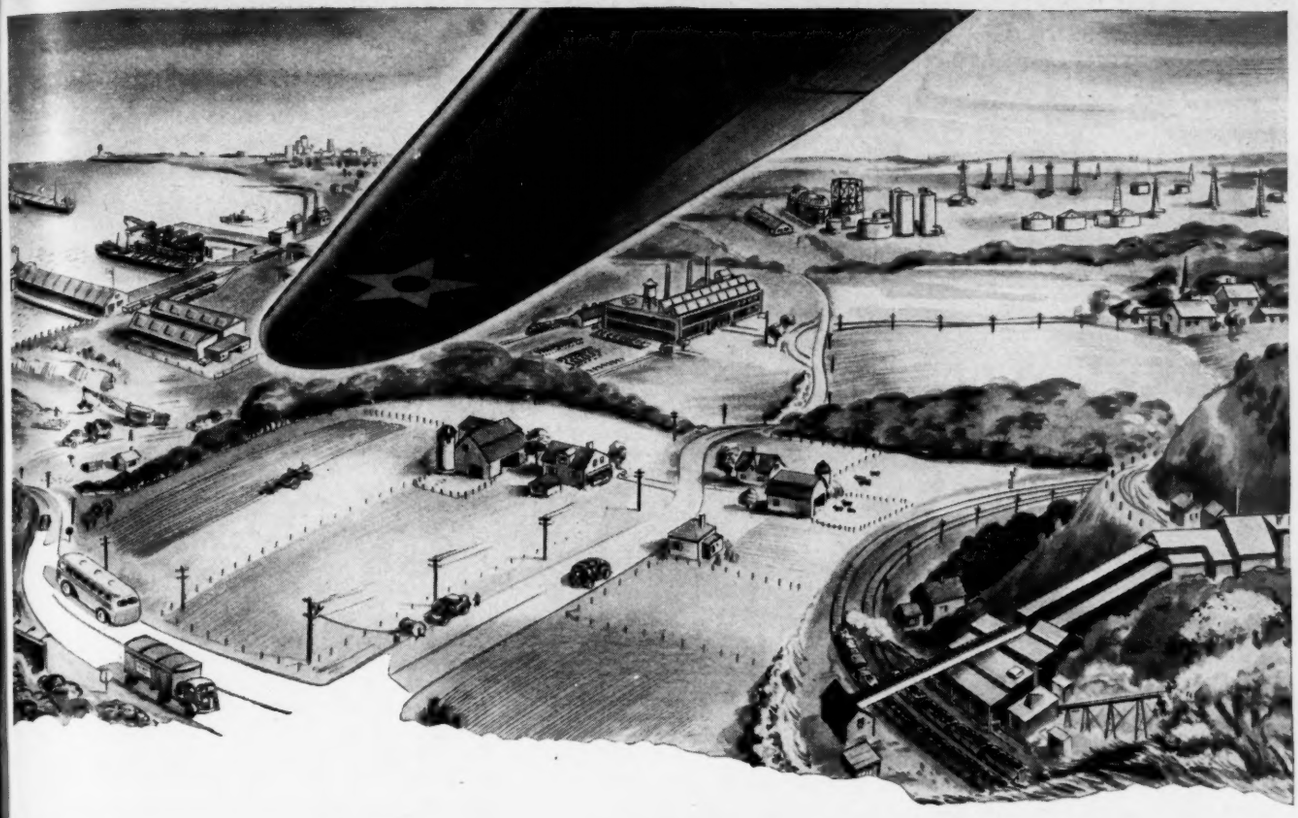
• Industrial conversion to coal has vastly increased mine operators' already unparalleled production requirements. To meet these extra demands, to insure an ever-increasing flow of coal from your operations specify BOWDIL Chains and Bits—use less power, fewer bits and make fewer repairs. Made from tough heat treated alloy steel, they are capable of cutting three to six times more than carbon steel bits. BOWDIL Bits cut *more* coal in *less* time—have ample clearance and adjust themselves to gauge.

It's patriottc to save time on deliveries and reduce costs. Help yourself and your Country—demand BOWDIL Cutter Bars and Chains. Get the details today! Call in one of our representatives, or drop us a line—we'll send complete details immediately.

1. SAVE STEEL!—Distribute cutter bits from supply house and require all bits to be returned for inspection before scrapping. Bits turned in with only one point unused or not fully worn out should be sent back for further use.
2. Oil cutter chain at least after several places have been cut, and always upon completion of shift.
3. Tighten bits properly and reduce bit loss.
4. Keep cutter chain adjusted ¾" slack under frame in most cases.
5. Be sure cutter head is tight. When worn or too open, report to maintenance authority.
6. Don't operate chain unnecessarily when not actually cutting coal. This practice is a safety hazard and wastes steel by dulling bits.
7. Use care in setting jacks so bits will not strike them.
8. Bowdil Cutter Bars and Bits cut a thinner kerf, less fines; save power and reduce wear and tear on machine motors and gears.
9. Keep us advised of your requirements well ahead of actual needs.

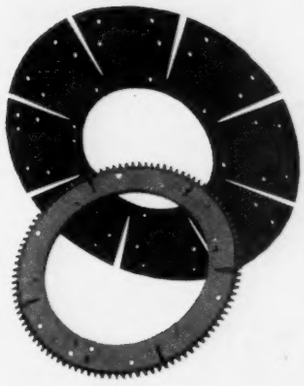
The BOWDIL Company
Canton COAL CUTTING EQUIPMENT Ohio



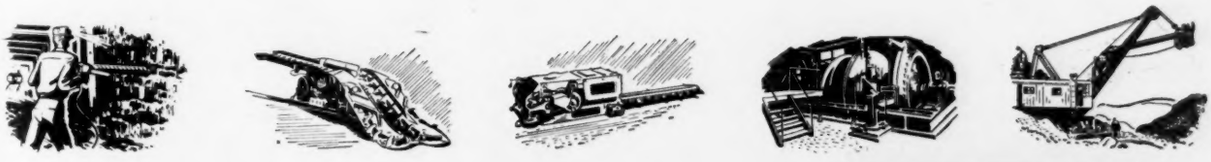
Velvetouch Dependability is Established

on TWO FRONTS

VELVETOUCH Friction Materials are doing an outstanding job in many applications on America's combat planes, notably in brakes and supercharger clutches. On the home front, too, this miracle of powder metallurgy has proven its dependability in all fields where conditions are unusually severe . . . in earth-moving equipment, in agricultural and industrial machinery, in oil well and marine equipment. Especially on tough jobs in the coal mining industry . . . in coal cutters and loaders, power shovels, mine hoists . . . VELVETOUCH is setting new high standards for smooth, positive operation of clutches and brakes.



VELVETOUCH is an all-metal friction material — a combination of sintered powdered metals, compressed and welded to a solid metal backing. Supplied in a wide variety of constructions to meet all requirements for mining equipment.



TRADE MARK REG. U. S PAT OFF.

Velvetouch

THE S. K. WELLMAN CO.

1374 EAST 51ST STREET
CLEVELAND, OHIO, U.S.A.

PIONEERS IN PUTTING POWDER METALLURGY TO WORK FOR INDUSTRY

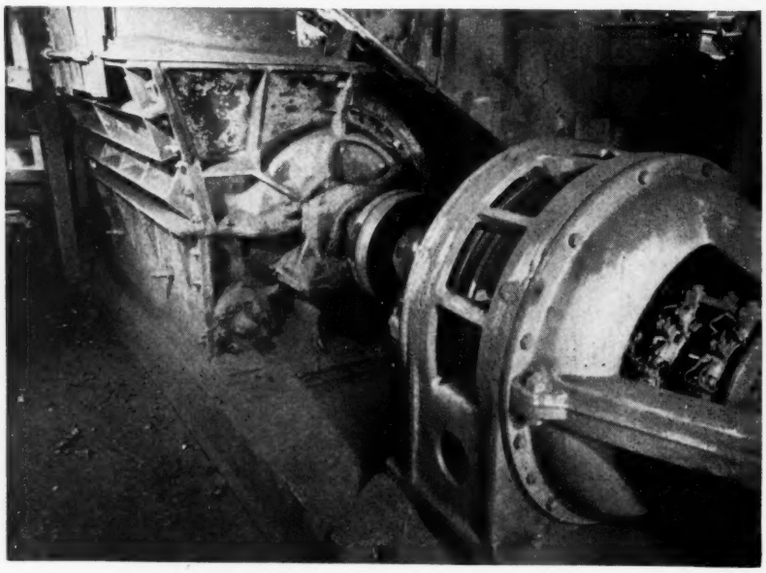
FOR GREATER *Speed* IN PRODUCING STOKER COAL SIZES..

AMERICAN "AC" Type ROLLING RING CRUSHER

★ The American Rolling Ring Crusher with its ability to crush large tonnages day after day has been called into service by many mines as a dependable stoker coal producer. You can amply and economically provide for your crushing requirements with the American Rolling Ring Crusher. It speeds up the work by staying on the job and by action of the crushing parts. The American Rolling Ring Crusher is built in many sizes. Each unit is arranged to meet the particular requirements of each application—each is compact, externally adjusted, easily accessible. We will be glad to thoroughly survey your requirements and recommend only such equipment needed for your specific purposes. Each crusher guaranteed for the job.

PLUS THESE ADVANTAGES . . .

1. Greater range of reduction
2. Uniformity of size
3. Crushing at less than a cent a ton
4. Extreme simplicity of operation.



Size 60S rated to crush 300 tons per hour of 6-inch lump down to ¾-inch.

Why you get Splitting Action instead of Crushing

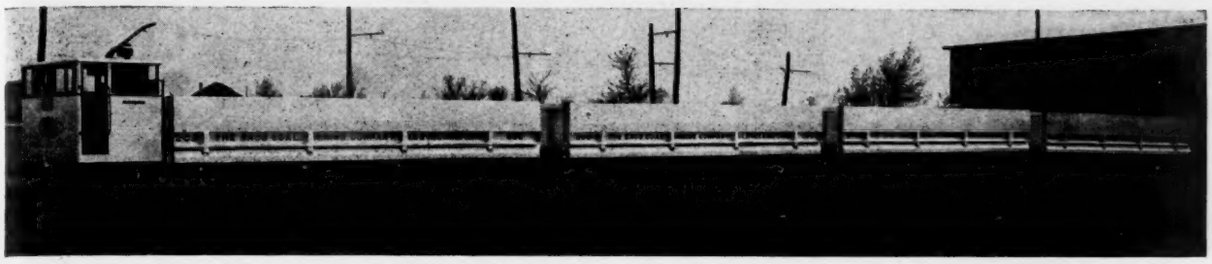
● Patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher. The Rings have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at specific speeds. In contact with solid metal the rings are momentarily deflected from their usual course because they are free to swing back out of position. No shear pins or other safety devices that require attention.

Grinding Parts

● The crushing parts are: breaker plate, grinding plate, grate bars and rings. All made of manganese steel. It applies centrifugal force at right angles to a horizontal shaft. The rings strike, roll, and grind. They are thrown back when they encounter non-crushable material, protecting the crusher from damage by foreign materials. This flexibility or "give" makes the crusher self-acting against tramp material.

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS, MISSOURI

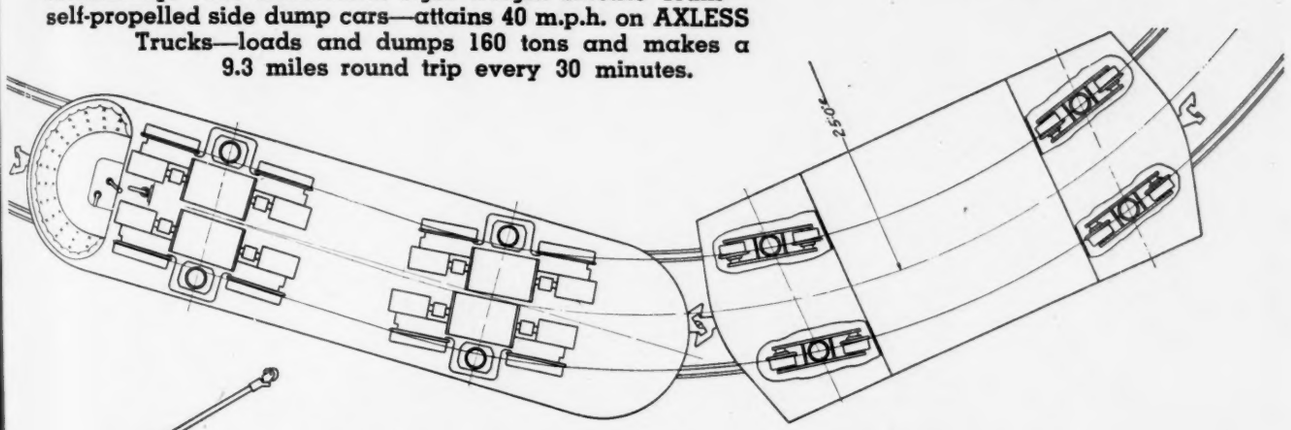
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

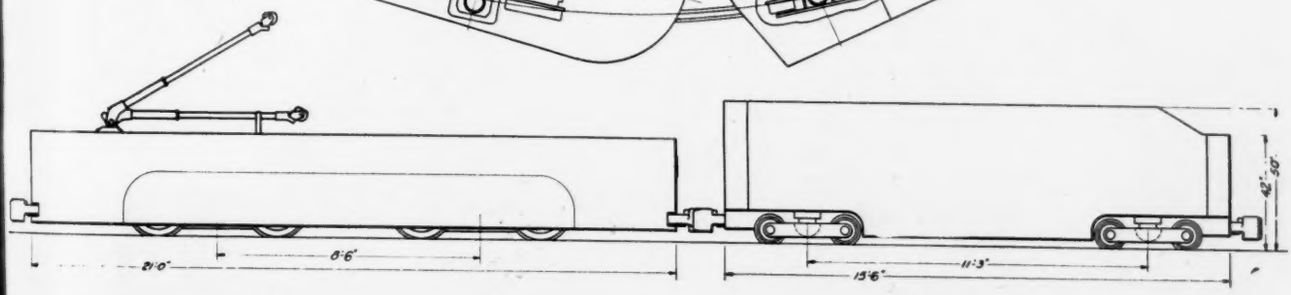


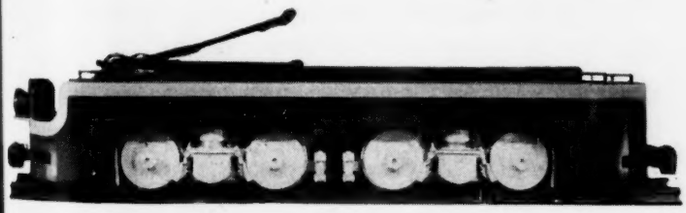
DIFFERENTIAL EQUIPMENT

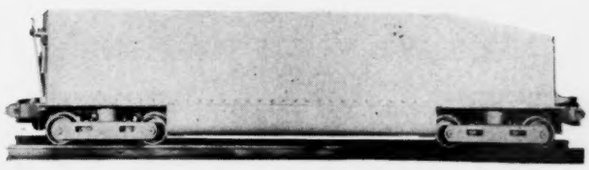
• Differential has revolutionized coal mine transportation with powerful, light weight, Electric Trains. The high pay load ratio and faster speeds require fewer trains. Differential AXLESS Trucks reduce train resistance due to better alignment of wheels with rails, independent rotation of wheels, less flange, tread and rail wear. Safety at higher speeds is possible due to low center of gravity and better roadability. The Differential light weight Electric Train—self-propelled side dump cars—attains 40 m.p.h. on AXLESS Trucks—loads and dumps 160 tons and makes a 9.3 miles round trip every 30 minutes.

WILL LOWER YOUR HAULAGE COSTS









Differential 360 horsepower, 1 hr. rating or 312 HP continuous rating, 8-wheel AXLESS Locomotives have much more adhesion available for tractive effort and braking . . . will pull longer trains at higher speeds with greater safety . . . give track less punishment . . . use less electric current per ton of coal hauled. Differential 10-ton AXLESS Mine Cars increase mining capacity, require fewer cars and less maintenance, smoother riding and maximum safety . . . greatly reduce mining cost.

DIFFERENTIAL STEEL CAR CO.

FINDLAY, OHIO

Builders of haulage equipment since 1915.

Mine Cars • Mine Locomotives • Rock Larries • Dumping Devises • Burden Bearing Locomotives • Stock Piling Cars • Complete Haulage Systems

Eye Accidents are Serious in Times of Peace... DISASTROUS in TIMES OF WAR!

...all your Mine Workers Need *AO GOGGLES*

In normal times, unguarded eyes are constant threats to profits.

Today, an eye accident to a miner will not only disrupt production schedules and raise costs, but it may also rob you of the services of an *irreplaceable* worker... a man it took a long time to train.

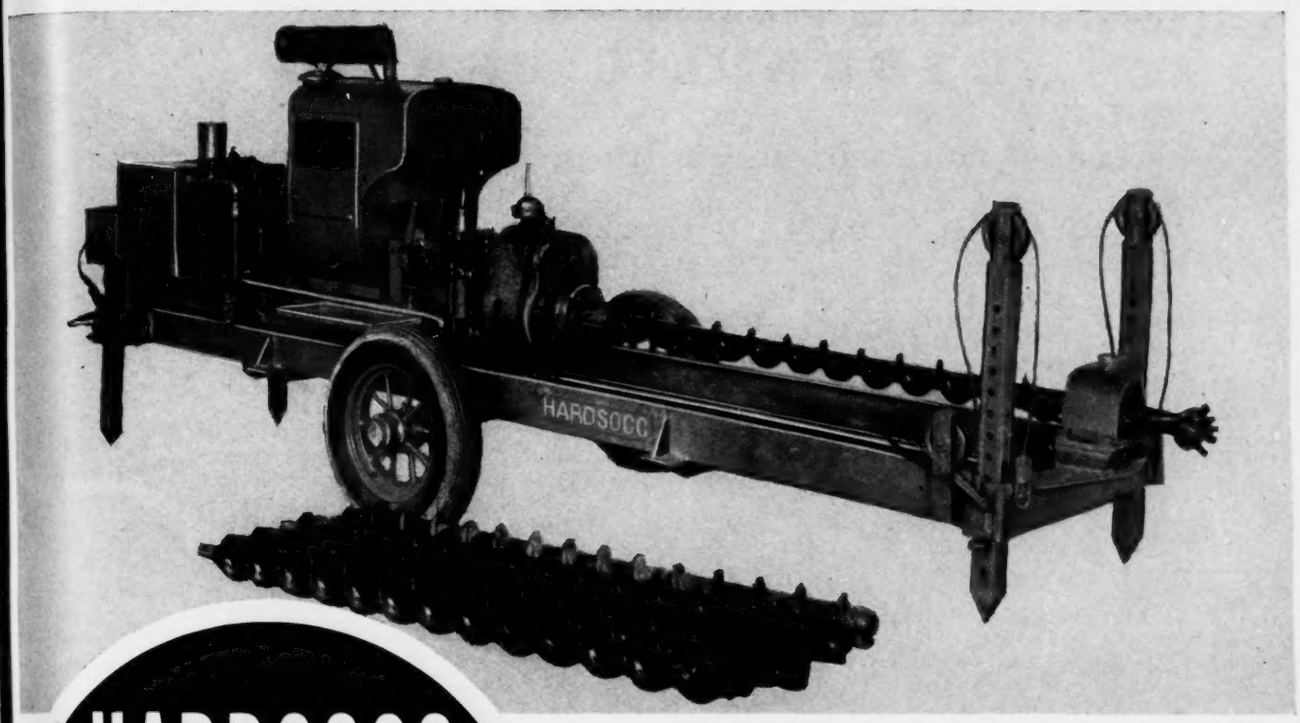
Don't take a *single* chance of letting eye accidents strike your property! American Optical Company offers the correct protection for every type of eye-hazardous job. AO goggles are strong, light, comfortable, easily fitted. Your Mine Safety Appliances Company representative will gladly show you how they can protect eyes on your property . . . call *him* today.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

174 FEET DRILLED IN ONE HOUR AND FIFTEEN MINUTES, with Ease



HARDSOCG *Horizontal* STRIP PIT DRILL

Strip mines have found this horizontal type drill has very definite advantages for overburden drilling. Horizontal drilling permits unlimited powder distribution patterns in a hole. Holes may be drilled parallel to and immediately under particularly hard strata which is then completely broken by the shot. Depending upon the amount and distribution of your powder, your overburden can be left standing or an average of one-third can be thrown over into the pit thus reducing your shovel's operating time, costs, and upkeep. Horizontal drilling and shooting leave a tight, straight, SAFE, face for your next cut.

This equipment drilled the deepest horizontal hole for shooting purposes thus far reported, having gone 174 ft. in 1 hr. 15 min. with ease.

The HARDSOCG HORIZONTAL DRILL may be elevated hydraulically front and rear. The wheels are removable. It can be transported on or towed by a truck from pit to pit. For drilling it may be either mounted on a truck or set up in your pit. In your pit, it may be pulled from hole to hole by hand. It weights about a ton, is inexpensive to operate, is usually run by an operator and ONE helper. Holes up to 6 inches are drilled with HARDSOCG Alloy Steel Bits, Cutter Heads, and Conveyor Augers. Holes are varied in depth by the number of 6 ft. augers used.

Powered by a Wisconsin 4-cylinder, air-cooled motor. Gear Reduction Unit uses Timken Bearings. THIS drill is hydraulically controlled by Vickers Hydraulic Equipment.

WRITE

to us for further data or to our eastern representatives

READ FULL DETAILS ON THIS COST CUTTING EQUIPMENT

SIMPLE IN DESIGN . . . RUGGED CONSTRUCTION . . . LOW IN COST

HARDSOCG MANUFACTURING CO.

Manufacturers of

POWER DRIVEN ROTARY DRILLING EQUIPMENT • MINERS TOOLS & SUPPLIES

Since 1879

OTTUMWA, IOWA

Eastern Representatives:

AMERICAN DRILLING CO.

201 Walnut Ave.,

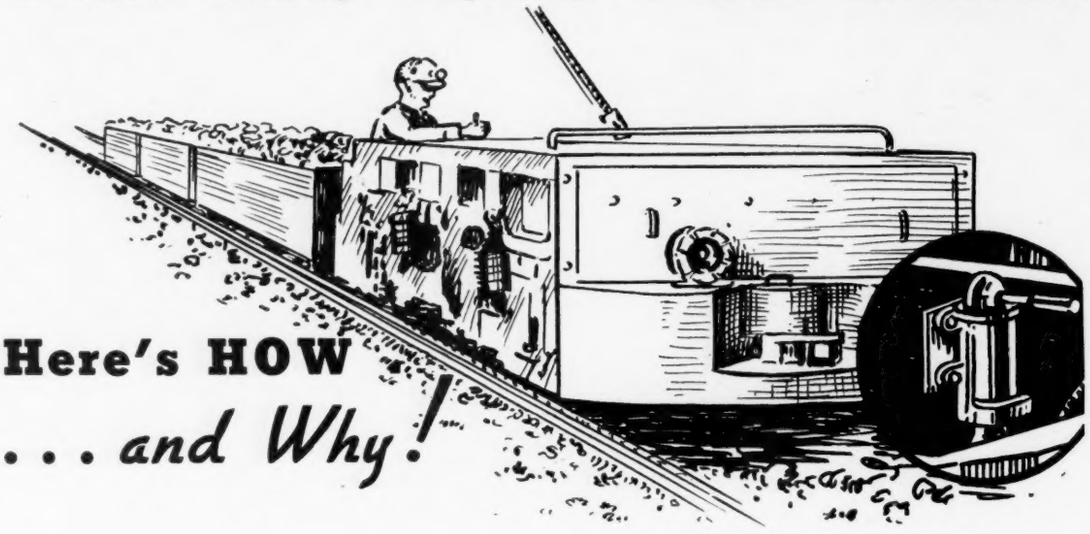
Greensburg, Penna.

Phone 1626

Westinghouse

HYDRAULIC BRAKES

Increase Haulage Capacity of Small Locomotives



Here's HOW

. . . and Why!

Quicker stops and slow-downs than with hand brakes.
Instant response, effortless manipulation, ample power

More loaded cars kept rolling, more trips made.
Available braking for heavy loads, higher speeds.

Quicker spotting of cars at mechanical loaders.
Fast, flexible action permits quick stops and starts.

Time-saving descent on all grades with uniform safety.
Adequate braking on tap safeguards freer running speeds.

Less time out for maintenance, greater availability.
No need for motor "bucking" or dragging brake shoes.

Tandem operation of locomotives is facilitated.
Brakes on both controlled by valve on leading unit.

This equipment is a simple, compact system easily installed on small locomotives, new or old.

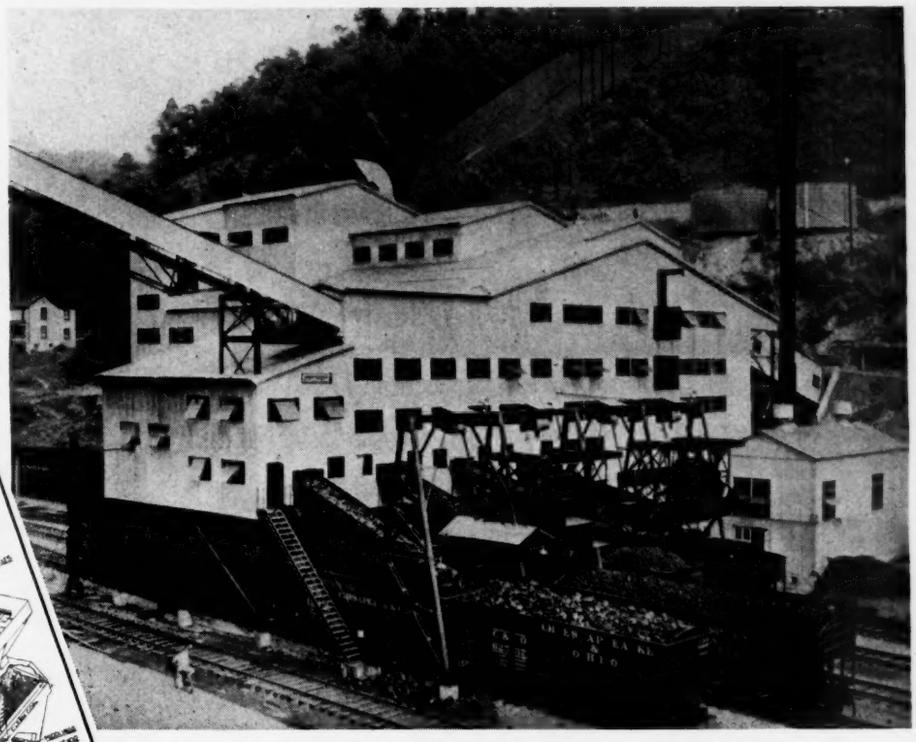
Complete information and prices furnished upon request.

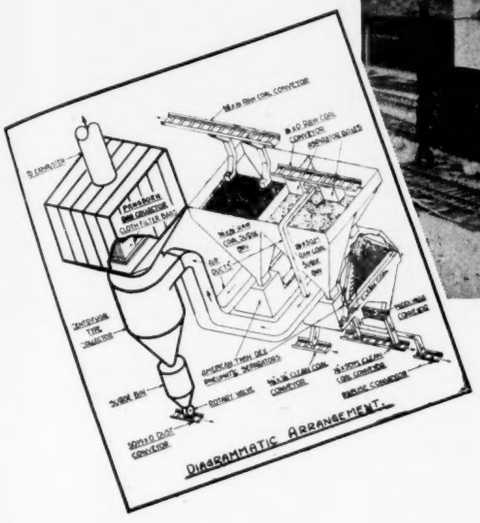
Westinghouse **AIR BRAKE CO.**

Industrial Division

PITTSBURGH, PENNSYLVANIA

Perfecting CONSOLIDATION'S New Cleaning Plant





PANGBORN Dust Control

The new central mechanical coal cleaning plant of Consolidation Coal Co., at Jenkins, Kentucky, was designed and built by the Fairmont Machinery Company, and started production in August, 1942. It handles the output of mines 204, 206 and 207, displacing two tipples.

More than 7600 tons of coal per day (working two shifts) have been shipped from this plant since it started operation. Equipped with the most modern and newest types of machinery and control devices, it is regarded by mining men as one of the finest in the industry.

Pangborn combined centrifugal-cloth collectors trap the 50-mesh x 0 dust. The dust exhausted from the aspirators and over the dry-cleaning tables is conveyed to four centrifugal type collectors, which remove the heavier particles. The air bearing finer particles then goes to PANGBORN cloth filter type collectors, where it gets a final cleaning. The dust is blended with other fines for use as fuel.

Write for Booklet fully describing Pangborn Dust Control and Collection equipment.

PANGBORN CORPORATION

Hagerstown, Maryland

"Buddy, meet an old friend"

You who use this friendly, long-life wire rope here at home can imagine what it would mean to you. Old side kicks who used to work with you are now in distant parts. If ever dependability counted in wire rope, it's doubly vital there. So when a Wickwire-rigged Liberty Ship gets through to them, and from its cargo unloads this reel with the friendly, trusted name, you can be sure it brings cheers.

The boys out there came from every American industry. They know that *you* need Wickwire Rope, too. So they're mighty thankful when you make what you have last longer, so that more can be spared for new shipping and for *their* heavy work along the fronts.

But when you do need more wire rope, please order it without reels, if lengths will permit, so our boys can have this greater convenience. Will you? Wickwire Spencer Steel Company, 500 Fifth Ave., New York, N.Y.

First Maritime M and Victory Fleet Flag in all New England was awarded to Wickwire for outstanding production achievements.

DO YOUR MEN UNDERSTAND STRETCH?

The free book, "Know Your Ropes," tells them just what to expect, and what to look out for. In addition it pictures splicing methods, life-extension rules, etc. This book can save you money—and save wire rope for the war fronts. Send for your free copy.

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

WS
WISSCO PRODUCTS

Of every 10 Mack trucks built ten years ago—7 are still doing duty! Here Peter Helck sketches a "baby Mack" at dock-side.

ITS MIDDLE NAME IS . . . WORK!

Today's Mack trucks range in size from tough little one-tonners to the biggest Prime Mover in Uncle Sam's Army. But big or little—if its last name is Mack, its middle name is *work!*

For 43 years, the world has watched the way Mack trucks wade into the toughest jobs in trucking. That is why the phrase "Built like a Mack truck" is a part of our language.

Mack Trucks, Inc., Long Island City, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

Mack

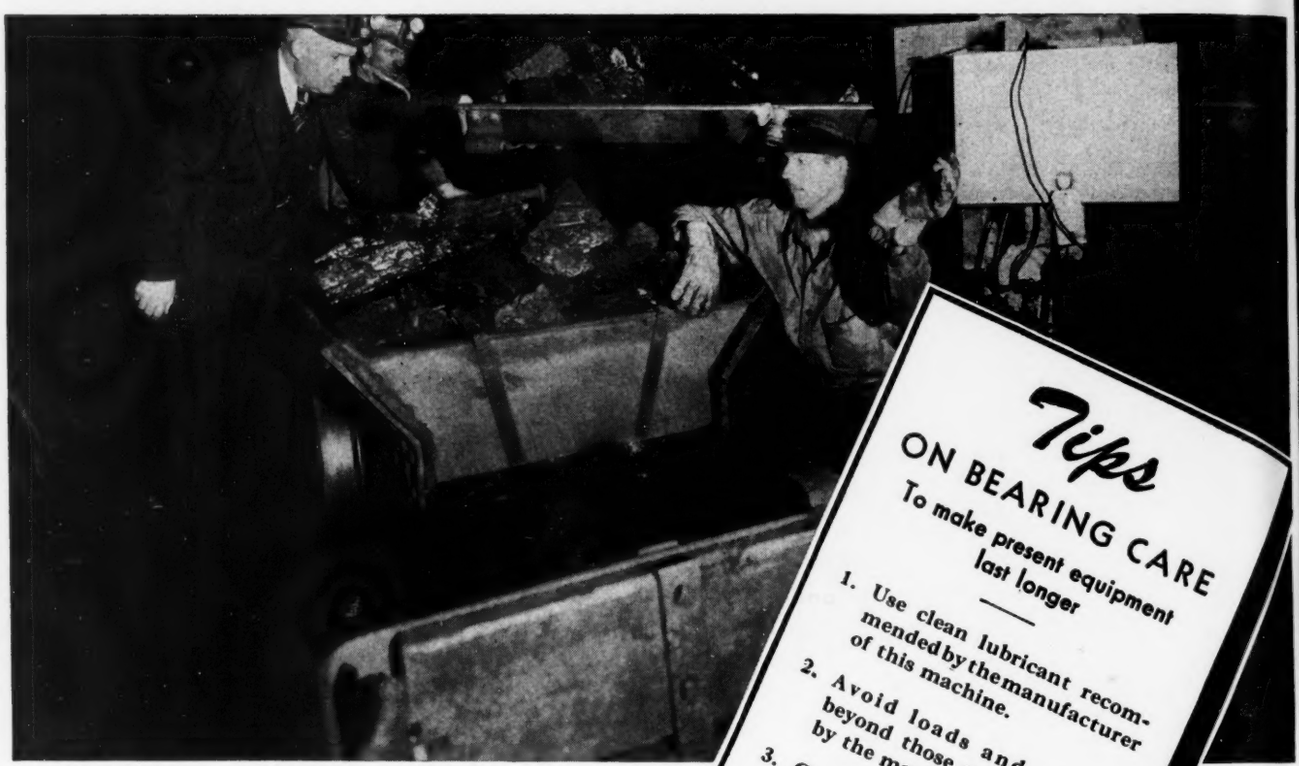
TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

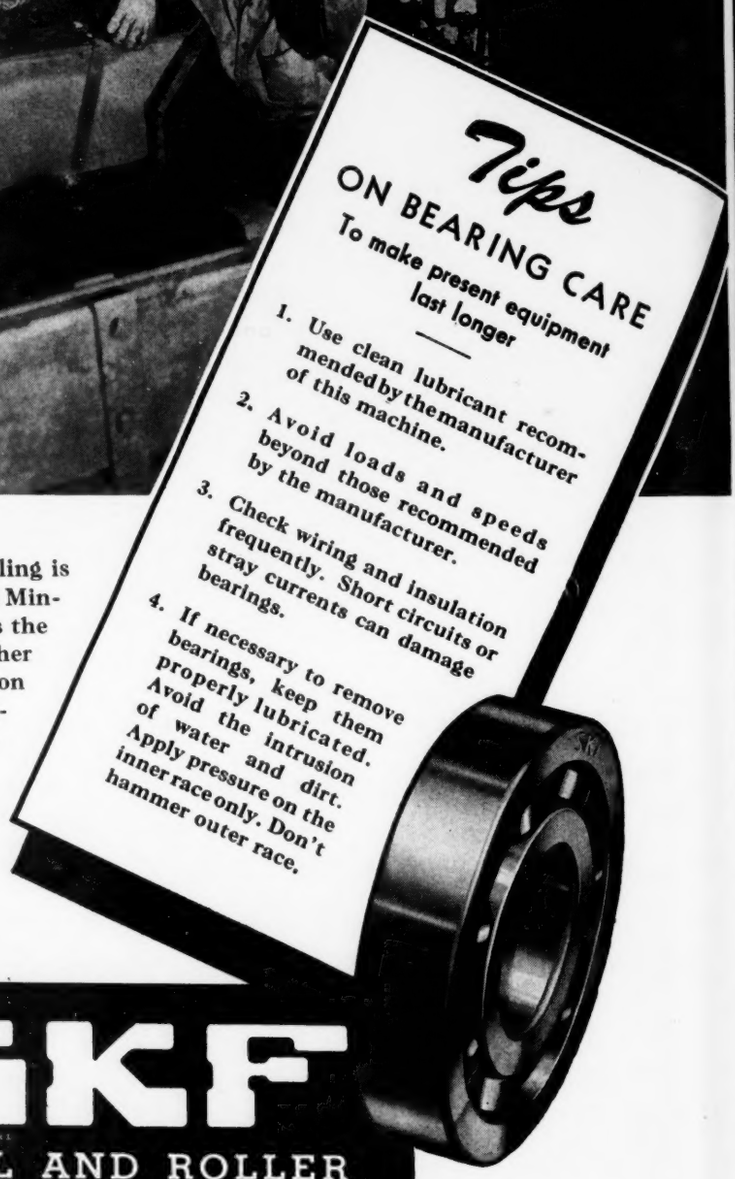
Coal Conveyed Fast

ON SKF BEARINGS



● *Built by* LA-DEL CONVEYOR & MFG. CO.

From mine to furnace, the tempo of coal handling is increasing on SKF-equipped machinery. For in Mining, as in all the other fields of Industry, this is the Age of Production Speed—an age in which higher speeds would be impossible without antifriction bearings. Take this Shaking Conveyor, for instance. It relies on SKF Bearings on the drive as it moves up to 130 tons of coal per hour directly into mine cars. As a result, heavy loads are carried without bearing binding. Lubricant is needed only infrequently. And adjustments are not required. With these factors in its bearings, a machine is ready to do an outstanding job . . . anytime. 5267

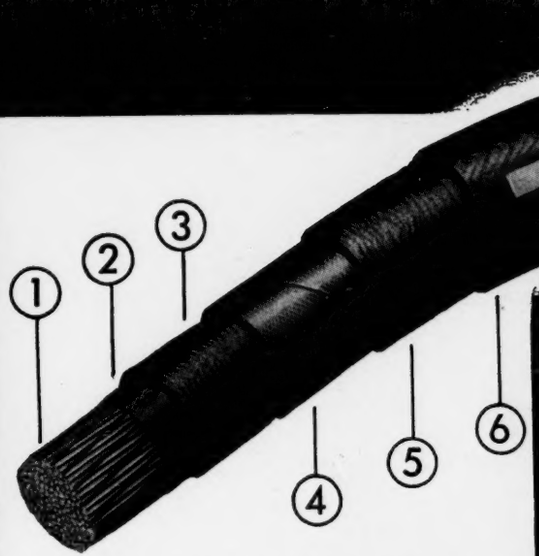

Tips
ON BEARING CARE
To make present equipment last longer
1. Use clean lubricant recommended by the manufacturer of this machine.
2. Avoid loads and speeds beyond those recommended by the manufacturer.
3. Check wiring and insulation frequently. Short circuits or stray currents can damage bearings.
4. If necessary to remove bearings, keep them properly lubricated. Avoid the intrusion of water and dirt. Apply pressure on the inner race only. Don't hammer outer race.

ARMY E NAVY

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILA., PA.

Rockbestos A.V.C.



Mining Cable

keeps equipment up at the face and out of the maintenance shop

Why Rockbestos A.V.C. Stands Up Under Severe Operating Conditions

1. Flexible tinned copper conductor, perfectly and permanently centered in helically applied insulation.

2. Paper separator makes stripping easy, prevents insulation from sticking to conductor.

3. Heatproof felted asbestos is unaffected by conductor-heating overloads and won't burn even when exposed to copper-melting arcs.

4. Varnished cambric for high dielectric strength and added moisture resistance, protected from heat, flame and oxidation by two felted asbestos walls.

5. Outer felted asbestos wall which serves as an effective heat-barrier against high ambient temperatures.

6. Heatproof, fireproof asbestos braid, resistant to moisture, oil, grease and alkalies, is diametered to properly fit bushings.

For size and diameters refer to McGraw-Hill Coal Mining Catalogs or write to Rockbestos Products Corporation, P. O. Box 1102, New Haven, Conn.

122 different wires and tables have been developed for severe operating conditions by Rockbestos

Today's 'round the clock operation of cutters, loaders and locomotives is tough on internal cables. That's why operators "in the know" are protecting this equipment against cable failures by rewiring with Rockbestos A.V.C. Mining Cable . . . the cable that is built for continuous trouble-free performance under severe operating conditions.

Rockbestos A.V.C. Mining Cable won't bake brittle or crack under hot overloads, high ambient temperatures, or vibration. Its permanent fireproof, heatproof and moisture resistant asbestos walls and asbestos braid won't ignite, burn or carry flame even under copper melting arcs. It won't bloom, swell, flow or rot because it is resistant to oil, grease and alkalies.

Write for the "jack-knife test" today, and see for yourself how Rockbestos A.V.C. Mining Cable increases production through reduced cable maintenance.

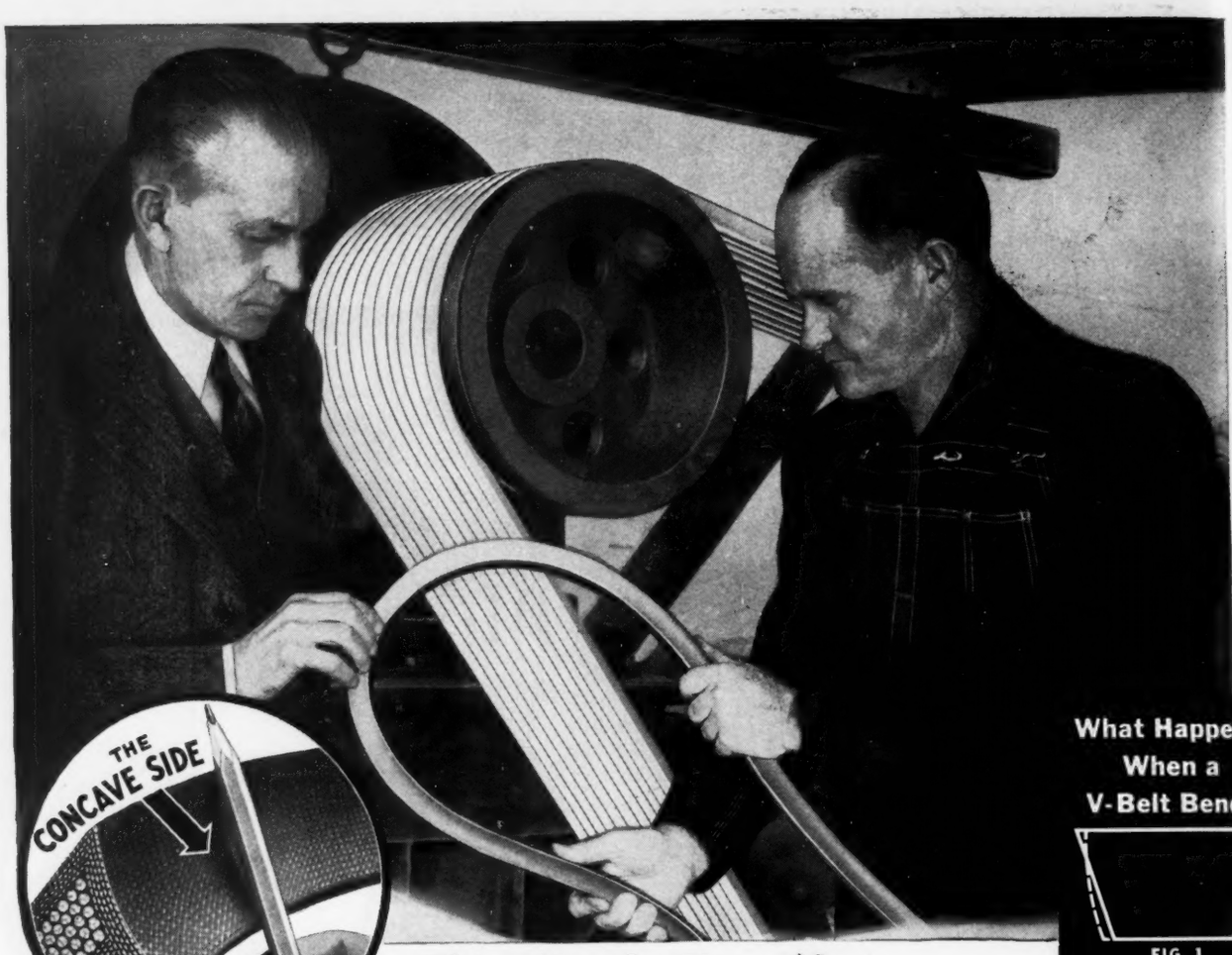
Rockbestos Products Corp., P. O. Box 1102, New Haven, Conn.

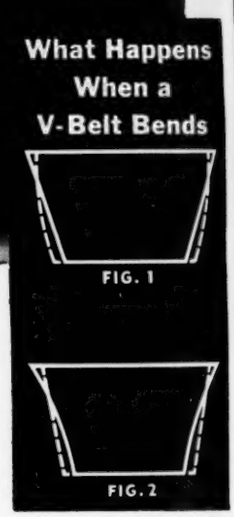
ROCKBESTOS A.V.C.

The Cable with Permanent Insulation

ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A. V. C."

BECKLEY, W. VA.: Beckley Mach. & Elec. Co.
BIRMINGHAM, ALA.: Moore-Handley Hdwe. Co.
BLUEFIELD, W. VA.: Superior-Sterling Co.
CLEVELAND, OHIO: Upson-Walton Co.
EVANSVILLE, IND.: Evansville Elec. & Mfg. Co.
FAIRMONT, W. VA.: Fairmont Supply Co.
HUNTINGTON, W. VA.: Banks-Miller Supply Co.
LOTHAIR, KY.: Mine Service Co.
MIDDLESBORO, KY.: Rogan & Rogan Co.
PITTSBURGH, PA.: Upson-Walton Co.
Westinghouse Elec. Supply Co.
SCRANTON, PA.: Penn. Elec. Engineering Co.
WILLIAMSON, W.VA.: Williamson Supply Co.





This Simple Test Shows the *Importance* of the CONCAVE SIDE!

432

You can see for yourself why belts built with the Concave side should be used in *your* plant if you will just pick up any straight-sided V-Belt and bend it as it bends in going around its pulley. As the belt bends, grip its sides as shown in the large photograph above. You will feel those sides *change shape*. The top of the belt, being under tension, narrows. The bottom, under compression, widens. The sides bulge out—as shown in Figure 1 (above, right).

Now bend a V-Belt that is built with the patented Concave side. The same shape-change takes place—but it merely *straightens* the precisely engineered Concave side, as shown in Figure 2. This belt, when bent, exactly fits its sheave groove. Two savings result. FIRST:—there is no out-bulge—therefore the entire side of the belt wears evenly and this means *longer life*. SECOND:—The entire side of the belt uniformly grips the sheave-groove wall. This carries heavier loads without slippage—a saving in belts for you, a saving in rubber for the nation.

Only belts built by Gates are built with the Concave side, a Gates patent.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington
NEW YORK CITY 215-219 Fourth Avenue
ATLANTA, GA. 738 C. & S. National Bank Building
LOS ANGELES, CAL. 2240 East Washington Boulevard
DENVER, COLO. 999 South Broadway
DALLAS, TEXAS 2213 Griffin Street
PORTLAND, ORE. 333 N. W. 5th Avenue
SAN FRANCISCO, CAL. 1090 Bryant Street

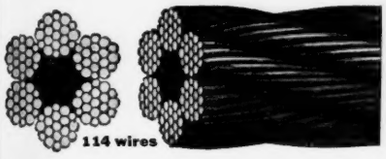
A Short Breaking-in Period Extends Wire Rope Life

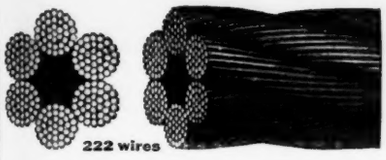
(This is Number 14 of a series of informative articles on how to get the most out of wire rope. It is directed to those who want to do everything they can to lengthen wire rope life and conserve steel. Other articles in the series are available on request.)

* * *

Cooperation in the present emergency is a vital necessity to success. It is a basic fundamental without which wars cannot be won, freedom cannot be maintained.

Cooperation within a piece of wire rope is just as essential to its success, but, being wire rope, it needs our help to do its job.





There are 114 or more wires in the average wire rope. They need to cooperate together by each carrying their share of the load. Illustrated above are two standard ropes showing number of wires in each.

The process of manufacture lays these wires into a rope and manufacturers ship this rope to you prepared to do its task.

The rope's success depends a great deal on how it becomes adapted to the equipment and to the work it must do.

WHAT "BREAKING IN" MEANS

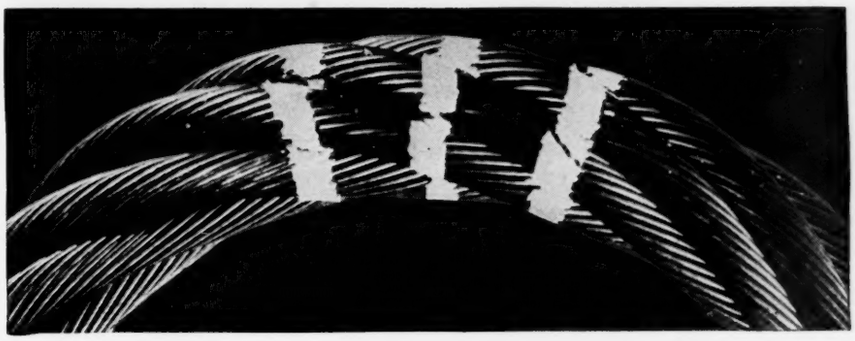
For example, we all know that the life of a book depends upon proper handling at the start. To simply grab a book and pop it open injures the binding, but by gradually and carefully opening the book at different points, it becomes "broken in" and its life is greatly extended.

Wire rope is a complex machine that has many wires, like a book has many pages. When the rope is put into use, a little care in handling and operating it at first, pays dividends later. Haste makes waste, which you want to avoid.

The breaking-in period gives the rope a chance to adapt itself to the track or path in which it must travel. It becomes accustomed to the arc of bending, becomes comfortably seated in the groove and assures the operator, after a short "trial run," that it is ready to go to work safely.

"BUT WE CAN'T TAKE THE TIME TODAY!"

The actual time taken to properly break in a rope is a small percentage of the time it takes to install a rope. If you must replace rope often and you can cut down the number of replacements by extending rope life, you will be conserving steel, reducing costs, and actually saving time.



BENDING DOES THIS

To get the picture (above) three white stripes were painted around a ⅝" 6x37 PREformed wire rope before bending. Then the wire rope was flexed by hand and this picture taken. Notice how the paint cracked up and separated, caused by the movement of the wires and strands to make the bend. Getting the rope accustomed to this flexing and wire and strand movement is a job of breaking in.

"WHAT SHALL WE DO?"

First, as has been explained in previous articles of this series, the equipment should be in good repair.

Second, as explained in article 9 of this series, the rope should be unwound from the reel or coil so as to avoid twisting and kinking.

Third, the rope should be firmly attached to the equipment, taking care to seize it with wire to prevent it untwisting.

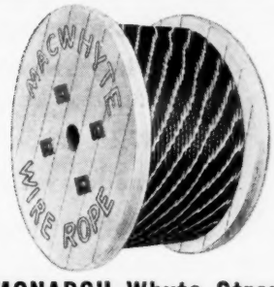
Fourth, after rope is attached and reeved around sheaves and drums, operate it without load a few times, until you see that it is flexing easily over sheaves and winding correctly on the drum.

Fifth, gradually increase the speed and load until the rope is operating up to its normal loading and speed.

WHAT ABOUT PRE-FORMED ROPE?

During the manufacture of the rope, the process of PREforming adjusts the wires and strands into the helical shape they take in the rope. This is often called a "breaking-in" process that helps prepare the rope for quick use and therefore it should not require as much "breaking in" on the job.

However, whether PREformed or non-preformed, it pays to handle the rope carefully and give it a chance to get accustomed to the operation of the equipment.



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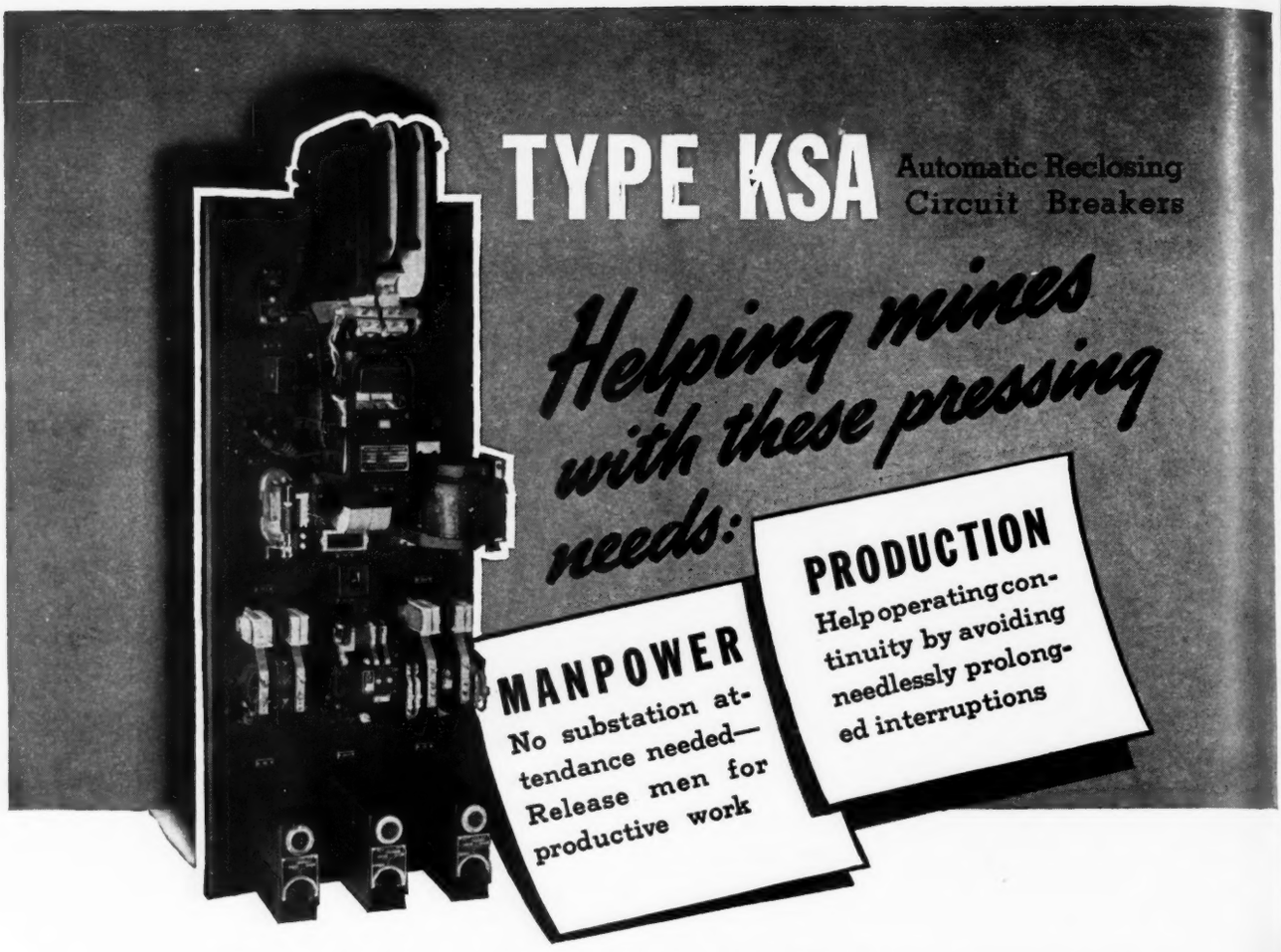
TYPE KSA
Automatic Reclosing Circuit Breakers
Helping mines with these pressing needs:
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No substation attendance needed—Release men for productive work
PRODUCTION
Help operating continuity by avoiding needlessly prolonged interruptions

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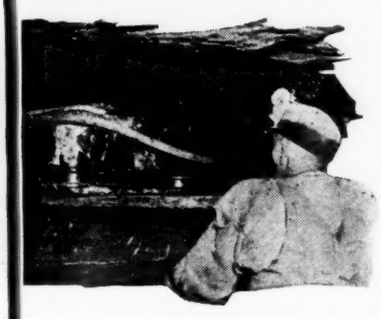
Here's the wire rope that helps you move the coal



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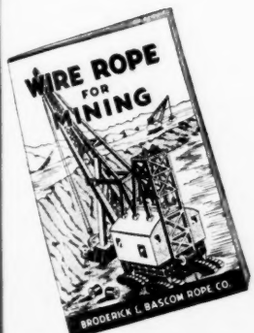

FREE—this 96-page Mining Hand Book of useful wire rope facts and tables. Send for it today.

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WORN CABLES

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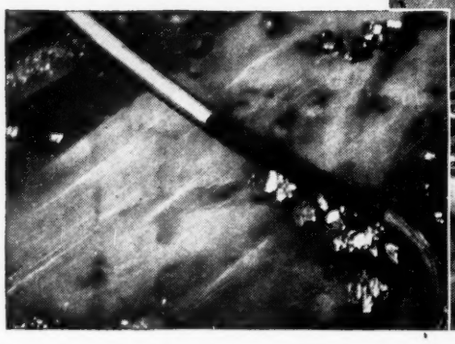
You CAN RE-NEW 'Em



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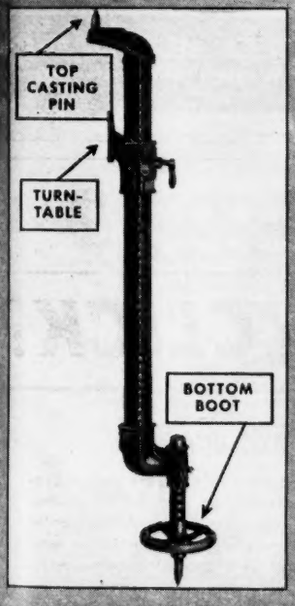
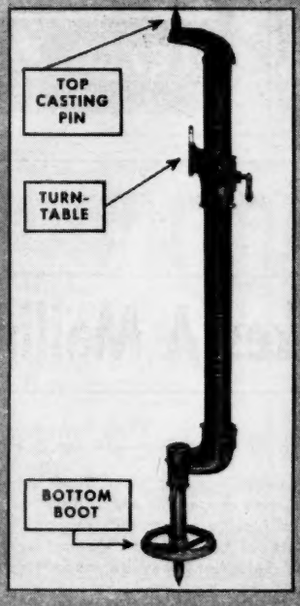
HOW TO GET MAXIMUM SERVICE FROM CP POST-MOUNTED ELECTRIC COAL DRILLS



WRONG WAY: Note that the pin in top casting, the turn-table and bottom boot are not in alignment. This causes bent thread bars and augers; results in excessive wear on hubs, liners, drill parts.



RIGHT WAY: Pin in top casting, turn-table and bottom boot are lined up. This keeps thread bars, augers straight; lessens wear on hubs, liners, drill parts, protects motor against excessive strain.

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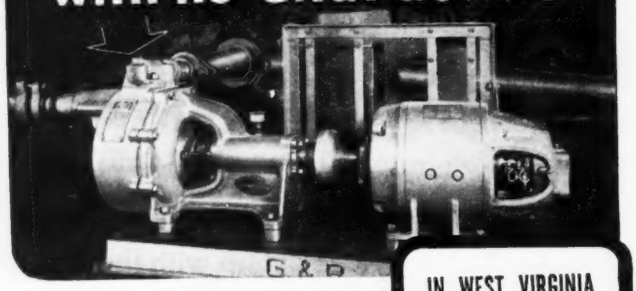

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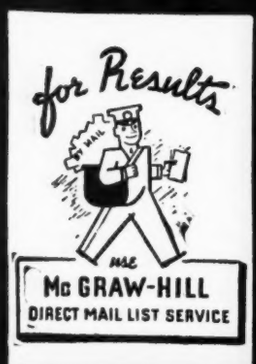

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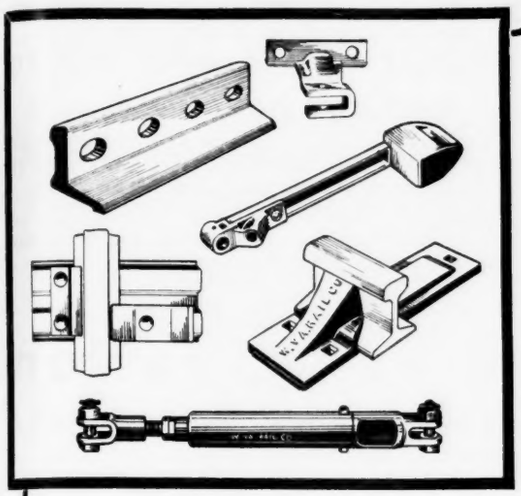

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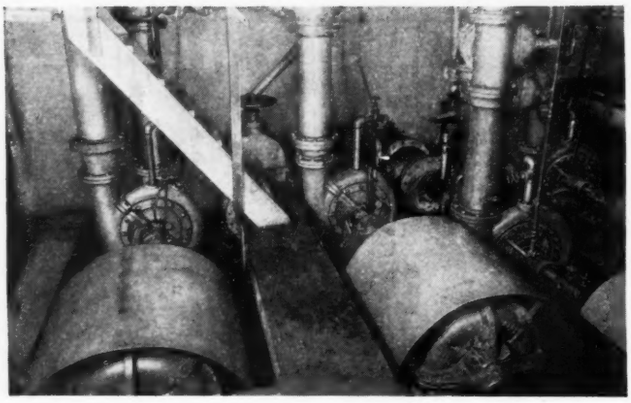

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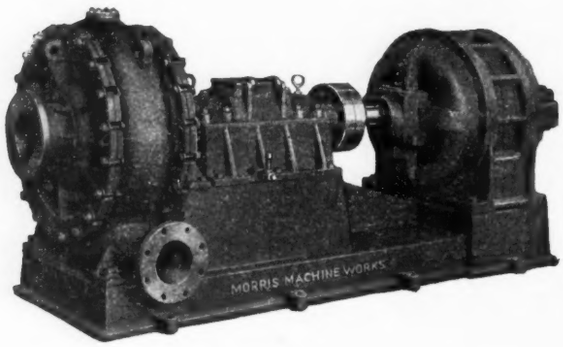

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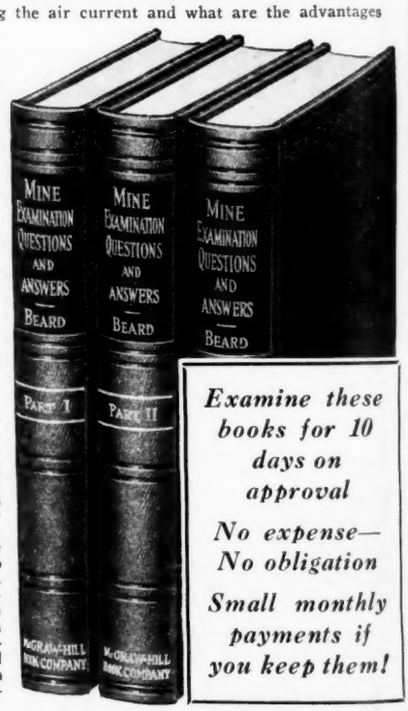

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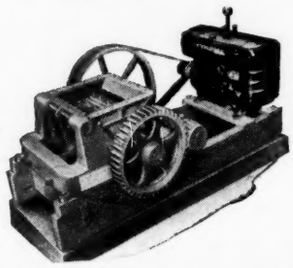

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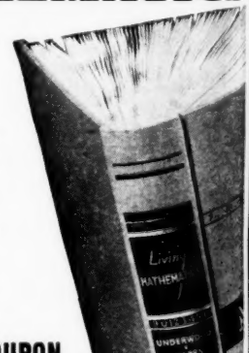

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150 KW Ridgway 250 V. DC 2200 V. AC 900 RPM.
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HP	Make	Speed	Wdg.	Type
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300	G.E.	600	S.R.	IM
200	G.E.	250	S.R.	MT 412
150	G.E.	720	S.R.	IM
150	West.	580	S.C.	CCL
150	G.E.	600	S.R.	IM
125	Al. Ch.	435	S.R.	
100	G.E.	500	S.R.	MI-25 cy.
100	Al. Ch.	900	S.C.	

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75 HP Lidgerwood sgl. fr. drum
50 HP Diamond 2 drums same Shaft
30 HP Clyde sgl. drum AC Motor
15 HP Lidgerwood sgl. dr. AC Motor

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Qu.	KVA	Pri. V.	Sec. V.
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5	2	"	"
100	5	"	"
82	7½	"	"
71	10	"	"
1	30	"	"
3	37 Rotary	4400/185	"
3	50	22000	2200
3	75	2200	110/220
1	100	2300	230/460
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3	100 Uptegraff	400	220
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1—100 KW Morgan Gard. 500 rpm.
1—100 KW Jeffrey 500 rpm.
1—75 KW West. SK 1950 rpm.

TRANSFORMERS—1 PH. 60 CY.
25—5 KVA 220 v. 122/244 G.E.
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50—10 KVA 2200 v. 122/244 West.
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3—37 KVA 4400 v. 185 v. Rotary Transformer
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3—100 KVA 6600 v. 220/440/550 v. Pgh.
3—150 KVA 2300 v. 6900 v. Pgh.
1—150 KVA 2080 v. 230/460 G.E. 3 ph.
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3—1500 KVA 22000 v. 6600 v. Allis Chal.

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1—217 KVA G.E. 2300/220/440 v. 3 ph. 60 cy. rpm. dir. con.
2—260 HP Buckeye horiz. 2 cyl. Diesel.

SLIPRING MOTORS—3 ph. 60 cy.

No.	HP	Make	Type	Volts	Rpm
1	700	G.E.	MT-432	2200	393
1	400	West.	CW-967A	220–440	1170
1	300	G.E.	I-M	220–440	600
1	260	Burke	EMV-65	220–440	600
3	250	G.E.	I-M	550	600
3	250	G.E.	I-M	2200/220/440	600
3	200	G.E.	I-M	2200/220/440	600
1	100	West.	CI	220/440	1750
1	75	West.	CI	220/440	860

230 V. O.C. MOTORS

HP	Make	Type	RPM
60	West.	SK-150	875
55	West.	S-10	825
40	West.	S-8L	935
40	G.E.	RC-31	1700
35	West.	SK-140	675
35	West.	S-7	950
30	G.E.	DC	1100
20	West.	SK-100L	900
15	West.	SK-90	825
10	West.	SK	1700
10	Al. Chal.		1200
10	West.	SK-70	850

A.C. SQUIRREL CAGE MOTORS

HP	Volts	Make	Type	RPM
250	550	G.E.	I-K	720
250	220/440	G.E.	KT	1200
225	2200/220/440	G.E.	Syn.	200
200	220	G.E.	I-K	600
200	2200	West.	CS	870
200	2200	G.E.	KT	1800
150	220	G.E.	I-K	450
150	550	G.E.	I-K	514
150	220/440	L. Allis	FX	1750
100	220/440	G.E.		1750

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1—CE-10 Sullivan, 250 volt
CE-7 Sullivans and parts
18—A.C. motors complete for standard and low vein Goodman machines

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1—8-Ton Westinghouse, 250 volt, 42" gage
1—6-Ton Westinghouse, 250 volt, 44" gage
1—6-Ton Westinghouse, 500 volt, 42" gage
1—6-Ton G. E. 823, 250 volt, 44" gage
1—4-Ton G. E. 825, low vein, 250 volt
1—6-Ton Ironton, 250 volt, low vein

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150-KW Steam plant, 250 volt
100-KW Ridgway M-G set, 250 volt

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10-T WESTGHE, 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHE, 250 V., 917-C Mts., 36"-44" Ga.
8-T JEFFREY, 250 V., MH-100 Mts., 36"-42" Ga.
8-T JEFFREY, 250 V., MH-85 Mts., 24"-36" Ga.
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8-T GOODMAN, 250 V., 132-A Mts., 36"-44" Ga.
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Ottumwa Hoist, 6,500 lb. 450 F.P.M., Single Drum, 100 H.P. Electric Motor.
LOCOMOTIVES—36" Ga. 4, 8 and 15 ton. Trolley and combination types.
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PUMPS—Deep Well, Vertical and Horizontal Centrifugal.
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1—6 ton, 30B, 48" 1—5 ton.
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Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—18 ton, 102, 42"
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915.

G.E.: All 250 volt. 5 ton 825, 44"
6 ton 803, 44", as is 4 ton 1022, 41, as is
6 ton 823, 44" 8 ton 839 motors
6 ton 801

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt
2—**Jeffrey** MH 110 Locomotives

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Goodman, 12A, 12AB, 12AA, 12G3A, 34B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 10—112AA
Sullivan, CE7, CE9, CE10, CR10 Low Vein.

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1—200 KW **G.E.** Rotary Converter.
1—200 KW **West.** Rotary.
1—150 KW **West.** Rotary.
1—150 KW, 1—100 K **Ridgeway** M-G Sets.
1—150 KW **Ridgeway** Rotary
1—150 KW **West.** Rotary converter.
1—100 KW **West.** M-G Sets.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, MH 88, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 12AB, 12AA, 33-1-4-T, 31-1-4-T. **G. E.** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature**, 250 V. Bracket Type, 150 KW **G. E.** HCC Bracket Type, and 150 KW **G. E.** TC Pedestal Type.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36" 30"x30" 24"x24" and 18"x16" * Diamond BIT SHARPENER * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS * LINK BELT * ELECTRIC SLATE DUMP * SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead, AC, 3-60-440, 1 ton and 2 ton * CAR RETARDERS, Fairmont 85# and 100#, STEAM POWER PLANT, 2 Boilers, 2 turbo-generators, 2300 volt, 1 Clam shell bucket 1¾ cubic yard, 1—Figure 8 drum. Coal Crushers—18x16—24x24—30x30.

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Goodman Standard & Universal.
AC & DC Rebuilt & Guaranteed

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5 to 20 ton.

STRIPPING SHOVELS

M. G. SETS & ROTARY CONVERTERS

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COAL CRUSHERS

Coal hopper with weigh pan and scale
Hydraulic Wheel Presses

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Warehouse: Carnegie, Pa.
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Some Steam Engines and Boilers available only slightly above the metal price

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ALL WEIGHTS

Especially 16#-56#-60#-65#-70#

First quality relaying rails and used bars of above weights, available for prompt shipment.

Used Spikes, Turnouts and Accessories.

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1—One **NORDBERG Hoist** No. 06392, 4 ft. drum, hydraulic brake direct connected 150 h.p., GE motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.

3—One **POMONA Vertical Pump,** 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.

4—One **ALLIS CHALMERS Pump,** type BS 13406, 100 h.p., motor AC, 220 v. 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

All of the above equipment in first class operating condition

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attractive prices

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Large Steam Pumps
Guaranteed Used Pipe
Steel Buildings
Tanks of all kinds and sizes

Jos. Greenspon's Son Pipe Corp.
Nat'l. Stock Yds. (St. Clair County) Ill.

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H.P.	MAKE	R P M	PH
	SLIP RING		
35	Lincoln HXJ	938	2
30	Lincoln	900	2
27½	A B See H K	600/1200	2
27	Otis	900	3
20	A B See	845	3
	SQUIRREL CAGE		
35	A B See HYK	720	3
	D C-220 V.		
25	Imperial D	700	
25	G E RC	1150	
15	Imperial (new) D	400	
	CONTINUOUS DUTY		
30	Imperial DC	1800	

Several hundred others from 5 to 30 H. P.

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STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Ton — 18" to 56" Track Gauge
GREENSBURG MACHINE CO.
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1500 MINE CARS

104 cu. ft. or 2.7 tons cap.
44" ga. 11'10" lg., 6' wide, 3' high
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THE RUBBER HEADQUARTERS

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48"	8	1/8"	1/16"	20"	5	1/8"	1/32"
42"	5	1/8"	1/16"	20"	4	1/8"	1/32"
36"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	6	1/8"	1/16"	16"	4	1/8"	1/32"
30"	5	1/8"	1/16"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"
24"	4	1/8"	1/32"				

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

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APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

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RUBBER HOSE

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I.D. Size	Each Length with Couplings Attached Length	per Length
¾"	25 feet	$4.25
	50 "	8.00
1"	25 "	6.25
	50 "	12.00
1¼"	25 "	7.50
	35 "	10.50
	40 "	12.00
	50 "	15.00
1½"	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

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2—2½ Marion Electric Shovels.

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(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2600, 5000 ft.
(14) Gasoline, 110, 160, 220, 310 & 370 ft.

COAL CRUSHERS:
Jeffrey Single Roll 18x18, 24x24 & 30x30
Link Belt 26x24 Double Roll Crusher

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Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 60 In. Large Stock here.

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100 KW Ridgway 1200 RPM 3/60/2300/250-275
150 KW G.E. 1200 RPM 3/60/2200-250-275
200 KW Ridgway 900 RPM 3/60/2200-250-275
3—100 KW G.E. 275 v. 1200 RPM Rotarys

STORAGE BATTERY LOCOMOTIVES:
2½ ton Whitcomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

TROLLEY LOCOMOTIVES:
2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman, 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey

VIBRATING SCREENS:
9 Tyler Hummer 3x6, 4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

CARS:
120—4 ton 42 ga. S.D. Mine Cars
60—Western 16-20-30 yd. Side Dump

SHOVELS, CRANES & DRAGLINES:
3 W 90' Boom, 6 & 160' Boom, Model 6150, 175' Boom, Diesel, Monighan Walkers
1 yd. K 30 Link Belt 50' Boom Crane
2 yd. Page 70' Boom Diesel Dragline
1 ¼ yd. Marion 450 Elec. Shovel
1 ½ yd. Lima Diesel Shovel & Dragline
2 yd. Link Belt Elec. Shovel & Dragline
25 ton Browning 50' Boom Loco. Crane
7 Conway 20A, 30A, 50A, 60 & 75 Muckers

MINE LOADERS:
Junior Joy 36 ga. Low Pan
Conway 20 Mucker
3—5 BU & 7 BU 36 or 42 ga. Joy
9—Goodman 200 & Jeffrey 441

MISCELLANEOUS:
5'x160' Traylor Rotary Dryer
100 HP G.E., 3/60/440 v.-900 RPM Elec. Motor
6—Goodman 12CA & 12DA 6 ft. Cutters
9x8 Sullivan Mine Compressors
Clamshell Buckets ¾, 1 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan Std. Ga. Gas. Loco.

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Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers & Rotary Converters. Also Rails, Screens, Pumps, Cars, Mine Loaders & Mining Machines.

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FOR SALE
COMPLETE POWER PLANT

With two 516 H.P. Stirling Boilers, two 500 KVA turbine driven Generators with barometric condensers, Cookson water heaters, super heaters, chain grate stokers, and all necessary piping. Also steam driven compressors, steam driven hoist, approximately 20,000 feet of 1½" and 1¼" cable. Also seven 250 H.P. 120# working pressure Firebox Boilers and a number of HRT Boilers.

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Sizes from 50 H.P. to 125 H.P., 50# W.P. to 350# W.P., Oil, Gas or Coal Fired, Shaker Grates or Stokers, Hartford or Oklahoma approved Certificate.

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Tulsa, Oklahoma
TELEPHONE 2-0058

COAL AGE ADVERTISERS IN THIS ISSUE

An asterisk preceding manufacturer's name indicates detailed information may be found in the 1942 *COAL MINING CATALOGS.* Where † appears after a company's name the advertisement does not appear in this issue, but was in preceding issues.

*Ahlberg Bearing Co..... 134
Allis Co., The Louis
Insert between pp. 28–31
*Allis-Chalmers Mfg. Co..... 22
*American Brattice Cloth Corp. 116
*American Cable Div. of American Chain & Cable Co.
Third Cover
American Car & Foundry Co. †
American Cyanamid & Chemical Corp..... †
*American Mine Door Co..... 124
American Optical Co..... 148
*American Pulverizer Co..... 146
*American Steel & Wire Co.. 34
Anaconda Wire & Cable Co. 97
Arkansas Fuel Oil Corp.... 127
Atlas Powder Co..... 16

Baker Mfg. Co..... †
*Barber-Greene Co..... †
Bemis Bro. Bag Co..... 110
*Bethlehem Steel Co..... 32
Bituminous Casualty Corp... †
*Bowdil Co..... 144
Broderick & Bascom Rope Co. 159
*Brown-Fayro Co..... 113
Builders-Providence, Inc..... 136

Calcium Chloride Ass'n..... †
Cardox Corp..... 37
*Carnegie-Illinois Steel Corp.. †
*Central Mine Equipment Co. 7
*Centrifugal & Mechanical Industries, Inc..... 109
Chicago Perforating Co..... 163
*Chicago Pneumatic Tool Co.. 161
*Cincinnati Mine Machinery Co. 98
Cities Service Oil Co..... 127
Clarkson Mfg. Co..... †
Coal Mining Catalogs..... 128
Coffing Hoist Co..... 138
Columbia Steel Co..... 34
Construction Machinery Co.. 166

*Deister Concentrator Co..... 124
*Deister Machine Co..... 135
DeLaval Steam Turbine Co.. 136
*Deming Co..... †
Differential Steel Car Co.... 147
Dings Magnetic Separator Co. †
Dorr Co 115
Dow Chemical Co..... †
*Duff-Norton Mfg. Co..... †
*duPont de Nemours & Co., E. I. (Fabrikoid Div.)..... †
*duPont de Nemours & Co., Inc. E. I. (Explosives Div.) †
*duPont de Nemours & Co., Inc. E. I. (Grassilli Chemicals Dept.)..... 28

Edison Storage Battery Div. of Thos. A. Edison, Inc.... 33
*Electric Storage Battery Co. 91
Ensign-Bickford Co..... 52
*Enterprise Wheel & Car Corp. †

Fairbanks Co..... 165
*Fairmont Machinery Co....46, 47
Flexible Steel Lacing Co.... 162
*Flocker & Co., John..... †
Flory Mfg. Co..... 163

Galigher Co..... 138
Gates Rubber Co..... 156
*General Electric Co.....14, 15
General Electric Co. (Appliance and Merchandising Dept.) ..... †
Goodman Mfg. Co.....42, 43
Goodrich Co., B. F..... †
Goodyear Tire & Rubber Co. †
*Gorman-Rupp Co..... 162
Gould Storage Battery Corp.. 12
*Goyne Steam Pump Co..... 111
Gulf Oil Corp..... 121
Gulf Refining Co..... 121
Guyan Machinery Co..... †

Hardsocg Mfg. Co..... 149
Harnischfeger Corp..... 26
*Hazard Insulated Wire Works 27
*Hazard Wire Rope Div. American Chain & Cable Co.... 95
Hendrick Mfg. Co..... 166
Hercules Powder Co..... †
Hockensmith Wheel & Mine Car Co..... †
Holmes & Bros. Robt..... †
Hulburt Oil & Grease Co.... 2, 3

I. T. E. Circuit Breaker Co. 158

*Jeffrey Mfg. Co.
Insert between pp. 16–21
Johnson-March Corp..... 129
Jones Foundry & Machine Co., W. A. 125
*Joy Mfg. Co.....50, 51

Keystone Electric Co..... 131
King Powder Co..... †
Koehler Mfg. Co..... 38

*Laughlin Co., Thomas..... 114
*Leschen & Sons Rope Co., A. 101
Lima Locomotive Works, Inc. †
Lincoln Engineering Co..... 165
*Link-Belt Co.....Fourth Cover

Mack Trucks, Inc..... 153
Macwhyte Co..... 157
Manhattan Rubber Mfg. Div. 123
Marlo Co..... 140
McGraw-Hill Book Co..... 164
McLanahan & Stone Corp.... 166
McNally-Pittsburg Mfg. Co.
Insert between pp. 38–41, 131
*Merrick Scale Mfg. Co..... 141
*Metal & Thermit Corp..... 120
*Mine Safety Appliances Co.. †
*Mining Safety Device Co.... †
*Morris Machine Works..... 164
Morrow Mfg. Co..... 166
Mosebach Electric & Supply Co. 130
*Myers-Whaley Co..... 41

*National Malleable & Steel Castings Co..... 107
*National Powder Co..... 49
*Norma-Hoffmann Bearings Corp. 36

Ohio Brass Co.....11, 44
Osmose Wood Preserving Co. of America, Inc..... †

Page Engrg. Co..... †
Pangborn Corp..... 151
*Pennsylvania Crusher Co.... 141
Philco Storage Battery Div.. 4
Phillips Mine & Mill Supply Co. 112
*Pittsburgh Knife & Forge Co. 140
*Pomona Pump Co..... 163
Post-Glover Electric Co.... 130
*Pressed Steel Car Co., Inc.. 137
Provident Life & Accident Insurance Co..... 119

Quaker Rubber Corp..... †

Roberts & Schaefer Co..... 143
*Robins Conveying Belt Co... 31
*Rockbestos Products Corp.... 155
*Roebling's Sons Co., John A. 126
Rollway Bearing Co., Inc.... †
*Ruberoid Co..... 160

*Salem Tool Co..... 140
*Sanford-Day Iron Works Co. 45
*Schramm, Inc..... 118
*Screen Equipment Co..... †
Searchlight Section.....167–171
Sinclair Refining Co..... 10
S K F Industries, Inc..... 154
Socony-Vacuum Oil Co..... †
Standard Oil Co. (Indiana).. 21
Stearns Magnetic Mfg. Co... 103
Sturtevant Mill Co..... †
*Sullivan Machinery Co.....24, 25
Sun Oil Co.....Second Cover
*Superior Carbon Products, Inc. 112

Tamping Bag Co..... †
Templeton-Kenly & Co..... †
Texas Co.....8, 9
Thermoid Co..... 105
Thornton Tandem Co..... †
Tide Water Associated Oil Co. †
Timber Engineering Co..... 102
*Timken Roller Bearing Co.. 13

Union Wire Rope Corp..... 48
United Engineers & Constructors, Inc..... 6
U. S. Rubber Corp..... 117
U. S. Steel Supply Co..... †
*U. S. Steel Subsidiaries..... 34
Upper Monongahela Valley Ass'n 141

Vulcan Iron Works..... 93

Walter Motor Truck Co..... 35
Wellman Co., S. K..... 145
Westinghouse Air Brake Co., Ind. Div..... 150
*Westinghouse Electric & Mfg. Co. 23
West Virginia Rail. Co..... 163
*Wickwire Spencer Steel Co.. 152
Wilmot Engrg. Co..... 138
Wood Shovel & Tool Co.... †
*Wyckoff & Son Co., A..... 172

■

Professional Service..... 142

■

SEARCHLIGHT SECTION

(Classified Advertising)

BUSINESS OPPORTUNITIES 167
CORE DRILLING 167
Hoffman Bros. Drilling Co.....167
Pennsylvania Drilling Co.....167
EMPLOYMENT 167
WANTED TO PURCHASE.....167
USED AND SURPLUS EQUIPMENT 167-171
All State Equipment Co., Inc.....169
Benny Equipment Co.....168
Bradford Supply Co., Inc.....170
Bryant, Leslie E.....167
Carlyle Rubber Co., Inc.....171
Cincinnati Machinery & Supply Co.170
Coal Mine Equipment Sales Co...167
Duquesne Electric Mfg. Co.....169
Electric Equipment Co.....167
Electric Service Co., Inc.....167
Erman Howell & Co., Inc.....170
First National Bank.....167
Foster Co., L. B.....168, 170
Frank, M. K.....168
Gales, George 167
Greensburg Machine Co.....170
Greenspon's Sons Pipe Corp., Jos.170
Guyan Machinery Co.....170
Hair Equipment Co.....168
Hyman-Michaels Co.....170
Industrial Equipment Corp.....170
Iron & Steel Products, Inc....167, 169
Jones Co., Geo. M.....168
Jones Mining Equipment Co.....168
Kirk Co., Inc., Wallace E.....169
Lawrence Pipe Co.....169
Martin, Guy S.....167
McCurdy, E. D.....167
Midwest Steel Corp.....168
Moore & Co.....171
Moorhead Reitmeyer Co.....168
Norton Coal Corp.....171
Prest-Fuel Corp. 167
Sherwood, E. C.....169
Smith Co., H. Y.....167
Teuscher Pulley & Belting Co.....168
Tidewater Equipt. & Mach. Corp..171
Tippins Machinery Co.....168
Utility Elevator Service.....168-170

WOOD PIPE for Mine Drainage

Wyckoff Wood Pipe has an 88 year record of perfect resistance to the corrosive action of sulphurous mine water. It is an ideal, long-time investment—light, easy to lay, and relatively low in first cost.

We also manufacture a special Hard Maple Pipe for flushing culm in the Anthracite Region and wood covering for underground steam lines.

Established 1855

A. WYCKOFF & SON CO.
Office and Factory
No. 35 Home Street, Elmira, N. Y.
The Originators of Machine Made Wood Pipe

SAVE MANY DAYS WITH

AMERICAN CABLE TRU•LAY *Preformed* WIRE ROPE

Last year over 180 million man-days of productive time were lost through industrial accidents—many of them needless.

Just think how many tanks, ships, guns, planes and so forth could have been made with those 180,000,000 man-days of work. . . . With our soldiers, sailors and marines giving their all, twenty-four hours a day, it is a crime not to do everything possible to reduce this terrific toll on needed production.

AMERICAN CABLE TRU-LAY PREFORMED WIRE ROPE is helping many operators keep down accidents because it is a safer rope to use and handle. **TRU-LAY PREFORMED** resists kinking and snarling. It resists whipping; spools better. When crown wires in **TRU-LAY PREFORMED** become worn and broken they do not wicker out to become chisel-sharp jaggers to tear workmen's hands. They remain in place, making **TRU-LAY** *much* safer to handle.

Use **AMERICAN CABLE TRU-LAY PREFORMED** for your next rope. Do everything possible to reduce lost-time accidents. America needs your full-time production.

AMERICAN CABLE DIVISION

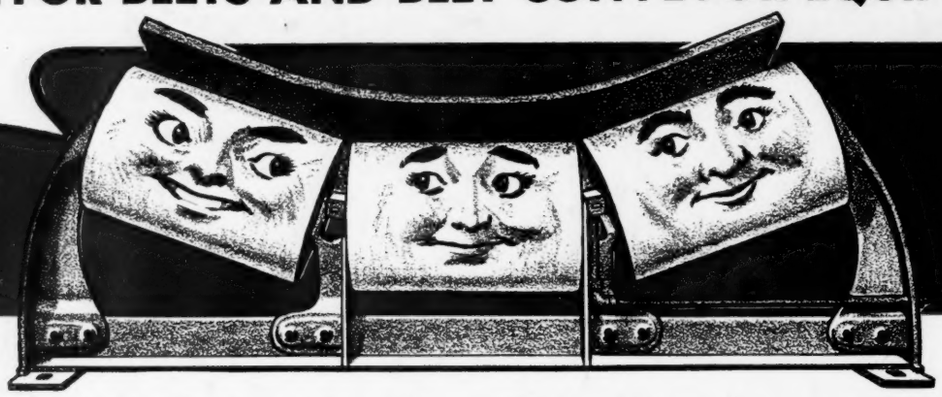
Wilkes-Barre, Pa., Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

BROTHER, BE WISE—PROLONG THE LIFE OF CONVEYOR BELTS AND BELT CONVEYOR EQUIPMENT!



If "we" could only talk—here's what we'd say: "Operators, please give us extra special care to make us last longer. This is mighty important during wartime, because materials used in belt conveyor equipment are needed for guns, tanks, planes and other war equipment. Be wise—be patriotic—follow this advice—it will pay extra dividends in trouble-free operation."

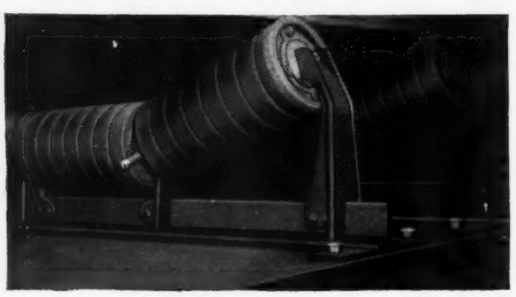
1

KEEP INSTALLATION CLEAN. Cleanliness plays an important part in prolonging the life of your belt conveyor equipment. Make a daily inspection to see that there is no accumulation of material that has spilled off the belt. If material is not removed it will cause the belt to drag over it as well as around the head, tail, snub and other pulleys. Consideration should also be given to cleaning the belt. The material being handled determines the type of cleaning device.

2

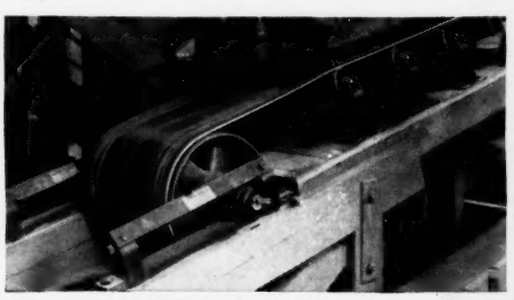
TRAIN THE BELT AND MAINTAIN THE TRAINING WITH SELF-ALIGNING IDLERS. It is important that both the carrying and return runs of a conveyor belt be kept practically central with its supporting idlers. This can be accomplished by properly "training" the belt on the conveyor . . maintaining that training is assured through the use of self-aligning idlers and return rolls. Link-Belt manufactures a complete line of self-aligning idlers to meet every need.

3



USE IMPACT IDLERS AT LOADING AND TRANSFER POINTS. When tons of ore, rock, coal and other materials slap a belt on the back, proper protection must be given at the loading point. The use of Link-Belt Rubber-Tread Impact Idlers definitely prolongs belt life by preventing cutting and bruising of belt . . cushioning even the heaviest blows . . thus greatly increasing belt life and protecting the belt, idler bearings and framework. Link-Belt engineers will be glad to make recommendations.

4



MAINTAIN PROPER BELT TENSION AND LUBRICATION. Eliminate excessive belt sag between idler rolls—Proper tension relieves the belt of much unnecessary wear . . Never over-lubricate idler rolls—inspection of one idler roll will often determine at what intervals equipment should be lubricated. Too much grease is as bad as too little.

AND MAKE IT A RULE to establish regular inspection periods—and make replacements with genuine Link-Belt parts when necessary. Link-Belt manufactures a complete line of idlers, pulleys, bearings, take-ups, drives, trippers, etc.

LINK-BELT

LINK-BELT COMPANY

Chicago, Indianapolis, Philadelphia, Pittsburgh, Wilkes-Barre, Huntington, W. Va., Denver, Kansas City, Mo., Cleveland, Detroit, St. Louis, Seattle, Toronto, Vancouver

67A